YORK®	PACKAGED ROOFTOP AIR CONDITIONING UNITS	
INSTALLATION, OPERATION & MAINTENANCE	New Release	Form 100.50-NOM6 (1207)

035-21979-002

eco2

YPAL 050
YPAL 051
YPAL 060
YPAL 061

DESIGN LEVEL F
SIMPLICITY ELITE CONTROL

LD13271

EPA Energy BUILDINGS ALLY

IMPORTANT!
READ BEFORE PROCEEDING!
GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual will have read and understood this document and any referenced materials. This individual will also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

NOTE is used to highlight additional information which may be helpful to you.

External wiring, unless specified as an optional connection in the manufacturer's product line, is NOT to be connected inside the micro panel cabinet. Devices such as relays, switches, transducers and controls may NOT be installed inside the micro panel. NO external wiring is allowed to be run through the micro panel. All wiring must be in accordance with JOHNSON CONTROLS's published specifications and must be performed ONLY by qualified JOHNSON CONTROLS personnel. JOHNSON CONTROLS will not be responsible for damages/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this will void the manufacturer's warranty and cause serious damage to property or injury to persons.

CHANGEABILITY OF THIS DOCUMENT

In complying with JOHNSON CONTROLS's policy for continuous product improvement, the information contained in this document is subject to change without notice. While JOHNSON CONTROLS makes no commitment to update or provide current information automatically to the manual owner, that information, if applicable, can be obtained by contacting the nearest JOHNSON CONTROLS Applied Systems office.

It is the responsibility of operating/service personnel to verify the applicability of these documents to the equipment in question. If there is any question in the mind of operating/service personnel as to the applicability of these documents, then prior to working on the equipment, they should verify with the owner whether the equipment has been modified and if current literature is available.

NOMENCLATURE

BASE MODEL NUMBER

YPAL050-061

1 Base
- Y

2 Product
- P

3
- A

4 Type
- L :Scroll

5 6 7 Nominal Capacity

5	6	7	
0	5	0	:50 Ton Capacity
0	5	1	:51 Ton Capacity
0	6	0	:60 Ton Capacity
0	6	1	:61 Ton Capacity

8 Application
- C :Cooling Only
- N :Staged Natural Gas Heat
- G :Staged Natural Gas Heat SS HX
- M :Full Modulating Gas Heat
- F :Full Modulating Gas Heat SS Staged HX
- E :Electric Heat
- H :Hot Water Heat
- S :Steam Heat

9
- C :Constant Volume
- V :VAV, VFD
- F :Flexsys

10 Refrigerant
- B :R-407C
- C :R-22
- E :R-410A

11 12 Voltage

11	12	
2	5	:208/3/60
2	5	:230/3/60
4	6	:460/3/60
5	8	:575/3/60
4	0	:380/3/60
4	5	:400/3/50

13 Supply Openings
- B :Bottom Supply
- L :Left Supply
- R :Right Supply

14 Return Openings
- B :Bottom Return
- R :Rear Return
- S :Side Return

15 Design
- F :Revision Level F

16 Special
- X :Standar
- S :Special
- A :Standar
- B :Special

LD13270

TABLE OF CONTENTS

BASE MODEL NUMBER 3
CHANGEABILITY OF THIS DOCUMENT 3
NOMENCLATURE 3
TABLE OF CONTENTS 4
LIST OF TABLES 11
LIST OF FIGURES 12
SECTION 1 – INTRODUCTION 13
ECOLOGICAL AND ECONOMICAL DESIGN 13
Condensing Section 13
Heating Section 14
AIR MANAGEMENT 15
CONTROLS 15
INDOOR AIR QUALITY 15
ELECTRICAL 16
SERVICE AND INSTALLATION 16
SECTION 2 – INSTALLATION 17
APPROVALS 17
LIMITATIONS 17
UNIT INSPECTION 17
LOCATIONS AND CLEARANCES 17
RIGGING AND HANDLING 19
UNIT WEIGHTS 20
Unit Placement 21
Roof Curb Installation 22
PHYSICAL DATA 23
GENERAL ARRANGEMENT DRAWING – 050-061 MODELS 25
Bottom Supply / Bottom Return 25
Bottom Supply / Side Return 26
Bottom Supply / Rear Return 27
Curb Layout Drawing / 050-061 Models 28
ELECTRICAL DATA 29
Electrical Service Sizing 29
Load Definitions: 29
FILTERS 32
CONDENSATE DRAIN 32
Condensate Drain Piping 32
Condensate Drain Trap 32
AIR HOODS FOR ECONOMIZER 33
AIR HOODS FOR FIXED OUTSIDE AIR (UNITS WITHOUT ECONOMIZER) 33
AIR HOODS FOR EXHAUST AIR 33

TABLE OF CONTENTS

FIELD WIRING 33
Thermostat 33
Fan input 33
Space Sensor 33
CO2 Sensor 34
Occupied / Unoccupied Input 34
Shutdown Input 34
Smoke Purge Input 34
BAS Economizer Input 34
Fault Output 34
VAV Heat Relay Output 35
Supply Air Temperature Reset 35
COMMUNICATION 35
DIRTY FILTER SWITCH 35
FIELD CONTROL WIRING CONNECTIONS 36
POWER WIRING 37
ELECTRICAL SERVICE SIZING 37
SINGLE-POINT POWER SUPPLY WIRING 38
SINGLE-POINT POWER SUPPLY WIRING WITH NON-FUSED DISCONNECT SWITCH 39
DUAL-POINT POWER SUPPLY WIRING 40
CONTROLS 41
TRANSDUCER PNEUMATIC TUBING 42
Static Pressure Control Plastic Tubing 42
Duct Static Transducer 42
Building Pressure Transducer 42
Static Pressure Probe Installation 42
DUCT SYSTEM 44
Duct Connection Guidelines 44
SOUND AND VIBRATION TRANSMISSION 44
GAS HEATING 45
GAS PIPING 45
GAS CONNECTION 45
Gas Piping Recommendations 45
COMBUSTION VENT 46
SECTION 3 – START-UP 47
CRANKCASE HEATERS 47
CHECKING THE SYSTEM PRIOR TO INITIAL START (NO POWER) 47
Unit Checks 47
UNIT CHECKS – POWER APPLIED 49
Verifying Compressor Rotation 49
Compressor Oil Level Check 49

TABLE OF CONTENTS

INITIAL START-UP 50
Refrigerant Charge 50
Checking Superheat and Subcooling 50
Subcooling (R-410A) 50
Superheat (R-410A) 50
Leak Checking 51
GAS HEAT MODELS 53
Pre-Start Checks: 53
Post Start Checks: 53
SECTION 4 – MAINTENANCE 55
GENERAL 55
PERIODIC MAINTENANCE – MONTHLY 55
Filters 55
Linkages 55
Compressors 55
Fan Bearing Lubrication 55
Recommended Lubricant for Fan Bearings 55
Condenser Coils 56
PERIODIC MAINTENANCE – THREE TO SIX MONTHS 56
Motor Bearing Lubrication 56
Belt Tension 56
PERIODIC MAINTENANCE – YEARLY 56
Entire Unit Inspection 56
Sheave Alignment: 56
Belts 56
Belt Replacement 57
Belt Tensioning: 57
Filter Drier Replacement 58
Forward Curved Fans 58
Fan Motor 59
Fan Shaft Bearings 59
Bearing Lock Devices 60
Eccentric Type 60
Torquing of Set-screws 61
SECTION 5 – SEQUENCE OF OPERATION 63
UNIT TYPE 63
OCCUPIED / UNOCCUPIED MODE 63
CONSTANT VOLUME MODE (CV) 63
Thermostat Input 64
Occupied Cooling 64
Unoccupied Cooling 64
Occupied Heating 65
Unoccupied Heating 65

TABLE OF CONTENTS

Space Sensor – Hard Wired or Communicated 65
Cooling Operation – Occupied or Unoccupied 65
Heating Operation – Occupied or Unoccupied 66
Stand Alone 66
Cooling Operation – Occupied or Unoccupied 67
Heating Operation – Occupied or Unoccupied 67
VARIABLE AIR VOLUME (VAV) 68
Cooling - Occupied with Thermostat 68
Cooling – Unoccupied with Thermostat 69
Occupied or Unoccupied Heating with a Thermostat 69
Occupied Cooling with Hard Wired or Communicated Space Sensor 69
Cooling – Unoccupied with a Hard Wired or Communicated Space Sensor 70
Heating – Occupied with a Hard Wired or Communicated Space Sensor 70
Heating – Unoccupied with a Hard Wired or Communicated Space Sensor 70
Occupied Cooling – Stand Alone 71
Cooling – Unoccupied Stand Alone 72
Heating – Occupied Stand Alone 72
Heating – Unoccupied Stand Alone 72
CONDENSER FAN OPERATION 72
COOLING COMPRESSOR LOCKOUT 72
Sequence of Operation 72
LOW AMBIENT OPERATION 73
Operation and Pressure Control Range 73
Configuration (Jumpers and Potentiometers) 73
SUPPLY FAN OPERATION 74
Constant Volume (CV) 74
Variable Air Volume (VAV) 75
VAV Supply Fan Speed Control 76
ECONOMIZER 76
Dry Bulb 76
Single Enthalpy 77
Dual Enthalpy 77
BAS ECONOMIZER OPERATION 77
Sequence of Operation 78
Constant Volume Economizer Set Point 78
Variable Air Volume Economizer Set Point 78
Economizer / Compressor Operation 79
Economizer PI Loop (Proportional and Integral) 79
ECONOMIZER LOADING 79
Constant Volume 80
Variable Air Volume 80

TABLE OF CONTENTS

COMFORT VENTILATION 81
Sequence of Operation 82
Conditions of Operation 82
EXCESSIVE SAT (SUPPLY AIR TEMPERATURE) CONTROL 82
Cooling 82
Heating 83
SPACE SENSOR WITH SET POINT ADJUSTMENT 84
Sequence of Operation 84
SPACE SENSOR FAULT OVERRIDE ENABLE 85
Sequence of Operation 85
REMOTE CONTROL 85
Sequence of Operation 85
REDLINE 85
Sequence of Operation 85
LOADSHED 86
Sequence of Operation 86
DIRTY FILTER 86
Sequence of Operation 86
METRIC OPERATION 86
INTELLI-START 86
Sequence of Operation 87
Subsequent Operation 87
MORNING WARM-UP 88
Sequence of Operation 88
HYDRONIC HEAT 89
Sequence of Operation 89
HYDRONIC HEAT FREEZE STAT 89
VENTILATION 89
Manual 90
Fixed Minimum 90
Sequence of Operation 90
Demand Ventilation 90
Definitions 91
Sequence of Operation 91
VENTILATION LOW AMBIENT MINIMUM POSITION RESET 91
Sequence of Operation 91
EXHAUST FAN OPERATION 92
On/Off Control Based on Outdoor Damper Position 92
Sequence of Operation 92
On/Off Control Based on Building Pressure 92
Sequence of Operation 93

TABLE OF CONTENTS

Modulating Damper with Fixed Speed Exhaust....93
Sequence of Operation....93
Modulating Exhaust with a VFD....93
Sequence of Operation....94
PRE-OCCUPANCY PURGE....94
Criteria for Operation....94
Sequence of Operation....94
ENERGY RECOVERY VENTILATOR....95
Sequence of Operation....95
LOW VOLTAGE PROTECTION....95
OUTDOOR AIR HEATING LOCKOUT....95
HOT GAS BYPASS....95
SPACE TEMPERATURE ALARM....95
Sequence of Operation....96
SAT ALARM FOR HEATING....96
Sequence of Operation....96
"Supply Air Temp Alarm Setpoint for Heating" Alarm....96
"Economizer Minimum Position" Alarm....97
SAT ALARM FOR COOLING....97
Sequence of Operation....97
"Supply Air Temp Alarm Setpoint for Cooling" Alarm....97
"Economizer Minimum Position" Alarm....98
ALARM HISTORY....98
SECTION 6 – USER INTERFACE....99
UNIT CONTROLLER INTERFACE....99
PROGRAM BUTTON....99
TEST/UP BUTTON....100
ADDRESS/DOWN BUTTON....100
ALARM/CHANGE....100
CHARACTER DISPLAY ADDRESSES & CODES....100
COMMUNICATION USING SIMPLICITY PC....104
Simplicity PC Download....104
USB Adapter Drive - Simplicity Pocket PC....106
Establishing Communication....107
Simplicity PC Data Screens....111
Revising Settings....126
SECTION 7 – PARAMETER DESCRIPTIONS AND OPTIONS....141
SECTION 8 – SERVICE....153
ANALOG INPUT OPERATION....153
Temperature Sensors....153
Duct Pressure Transducer....153

TABLE OF CONTENTS

Return Fan Pressure Transducer 154
Discharge Pressure Transducer 154
Building Pressure Transducer 154
Suction Pressure Transducer 155
Humidity Sensors 155
CO_2 Sensor 156
Furnace Status Input 156
FAULTS AND LOCKOUTS 160
Light Emitting Diode 160
Alarm Codes 160
Alarm Trouble Shooting 163
Refrigerant System Alarm Codes (01, 02, 03, 04, 09, 10, 11, 12) 163
Low Pressure Cutout Alarm (09, 10, 11, 12) 164
Limit Switch Alarms (13, 14, 15) 164
Gas Heating Alarms (16, 17, 18) 164
Space Temperature Sensor Alarm (19) 164
Supply Air Temperature Sensor Alarm (20) 165
Return Air Temperature Sensor Alarm (21) 165
Outdoor Air Temperature Sensor Alarm (22) 165
Dirty Filter Switch Alarm (23) 165
Supply Fan Air Proving Switch (24) 165
Supply Fan Air Proving Switch Closed Alarm (25) 165
Microelectronics Failure Alarm (26) 165
Microelectronics Failure Alarm (27) 165
Supply Fan Overload Alarm (28) 165
Outdoor Humidity Sensor Alarm (29) 166
Return Humidity Sensor Alarm (30) 166
IAQ (CO2) Sensor Alarm (31) 166
Time Clock Error Alarm (32) 166
Space Temperature Offset Alarm (33) 166
CV/VAV Input Alarm (34) 166
Low Voltage Alarm (35) 166
Smoke Purge Mode Alarm (36) 166
High Duct Static Pressure Alarm (37) 166
Supply Air Temperature Cooling Alarm (38) 167
Supply Air Temperature Heating Alarm (39) 167
Economizer Minimum Position Alarm (40) 167
Space Temperature Trending Alarm (41) 167
Duct Static Low Pressure Alarm (42) 167
Hot Water Coil Freeze Alarm (43) 167

LIST OF TABLES

TABLE 2-1 – VOLTAGE LIMITATIONS 17
TABLE 2-2 – UNIT WEIGHTS - 050-061 MODELS....20
TABLE 2-3 – UNIT CENTER OF GRAVITY....20
TABLE 2-4 – UNIT CORNER WEIGHTS - 050-061 MODELS 21
TABLE 2-5 – PHYSICAL DATA – 050-061 MODELS 23
TABLE 2-6 – PHYSICAL DATA - COMPRESSORS....24
TABLE 2-7 – COMPRESSOR DATA - R410A....29
TABLE 2-8 – POWER SUPPLY VOLTAGE LIMITS 29
TABLE 2-9 – SUPPLY AND EXHAUST FAN MOTOR DATA - ODP 30
TABLE 2-10 – SUPPLY AND EXHAUST FAN MOTOR DATA - TEFC 30
TABLE 2-11 – CONDENSER FAN MOTOR RLA - STANDARD FAN....30
TABLE 2-12 – CONDENSER FAN MOTOR RLA - LOW SOUND FAN (FUTURE OPTION) 30
TABLE 2-13 – MISCELLANEOUS ELECTRICAL DATA 30
TABLE 2-14 – ELECTRIC HEAT 31
TABLE 2-15 – AIRFLOW AND ENTERING AIR/AMBIENT LIMITATIONS....31
TABLE 2-16 – THREE PHASE POWER SUPPLY CONDUCTOR SIZE RANGE 41
TABLE 2-17 – SUPPLY AIR DUCT CONNECTION CONFIGURATIONS....44
TABLE 2-18 – RETURN AIR DUCT CONNECTION CONFIGURATIONS....44
TABLE 2-19 – PIPE SIZES 45
TABLE 3-1 –R410-A PRESSURE / TEMPERATURE CHART....52
TABLE 3-2 – LOW FIRE / HIGH FIRE PRESSURES....54
TABLE 3-3 – GAS HEAT PERFORMANCE DATA....54
TABLE 4-1 – FAN BEARING – LUBRICATION INTERVALS 55
TABLE 4-2 – SET SCREW TORQUE....61
TABLE 5-1 – BINARY OUTPUTS....73
TABLE 5-2 – VFD JUMPERS 73
TABLE 5-3 – POTENTIOMETER SETTINGS....73
TABLE 5-4 OPERATION DURING OFF CYCLE....81
TABLE 5-5 COMPRESSOR ON WHEN SPACE INPUT SATISFIED....81
TABLE 5-6 HEAT STAGE ON WHEN SPACE INPUT SATISFIED 82
TABLE 6-1 - PARAMETER POINTS LIST....101
TABLE 6-2 - SIMPLICITY ELITE DATA MAP 130
TABLE 7-1 – DEFINITIONS....141
TABLE 8-1 – TEMPERATURE SENSOR RESISTANCE 153
TABLE 8-2 – DUCT PRESSURE TRANSDUCER....154
TABLE 8-3 – BUILDING PRESSURE TRANSDUCER OUTPUT 154
TABLE 8-4 – RETURN FAN PRESSURE TRANSDUCER OUTPUT....154
TABLE 8-5 – PRESSURE TRANSDUCERS 155
TABLE 8-6 – HUMIDITY SENSOR OUTPUTS....155
TABLE 8-7 – CO2 SENSOR OUTPUT 156
TABLE 8-8 – WIRING DATA....157
TABLE 8-9 – ALARM CODE DESCRIPTIONS 161

LIST OF FIGURES

FIG. 1-1 – PACKAGED ROOFTOP AIR CONDITIONING UNIT 13
FIG. 2-1 – UNIT CLEARANCES 18
FIG. 2-2 – LIFTING LUG LOCATIONS 19
FIG. 2-3 – UNIT RIGGING 19
FIG. 2-4 – GENERAL ARRANGEMENT DRAWING 25
FIG. 2-5 – GENERAL ARRANGEMENT DRAWING 28
FIG. 2-6 – DRAIN TRAP SHOWING WATER LOCATION DURING DRAW THROUGH OPERATION STAGES 32
FIG. 2-7 – TRAP DETAIL FOR DRAW THROUGH APPLICATION 32
FIG. 2-8 – FIELD CONTROL WIRING CONNECTIONS 36
FIG. 2-9 – SINGLE-POINT POWER SUPPLY WIRING 38
FIG. 2-10 – SINGLE-POINT POWER SUPPLY WIRING WITH NON-FUSED DISCONNECT 39
FIG. 2-11 – DUAL-POINT POWER SUPPLY WIRING 40
FIG. 2-12 – ATMOSPHERIC SENSOR PROBE 43
FIG. 2-13 – TYPICAL GAS PIPING CONNECTION 45
FIG. 2-14 – COMBUSTION VENT 46
FIG. 3-1 – FAN HOLD DOWN BRACKETS 48
FIG. 3-2 – MANIFOLD GAS PRESSURE ADJUSTMENT 54
FIG. 4-1 – SHEAVE ALIGNMENT 56
FIG. 4-2 – FAN DATA PLATE - BELT TENSION 57
FIG. 4-3 – BELT TENSIONING GAUGE 57
FIG. 4-4 – EXAMPLE OF FC FAN SHAFT/WHEEL MARKING 58
FIG. 4-5 – BEARING WITH SETSCREW TYPE LOCKING DEVICE 60
FIG. 4-6 – BEARING WITH ECCENTRIC CAM 60
FIG. 4-7 – ECCENTRIC CAM LOCKING COLLAR BEARING INSTALLATION 61
FIG. 4-8 – SPLIT BEARING 61
FIG. 5-1 – CONDENSER FAN VFD POTENTIOMETER SETTINGS 73
FIG. 6-1 – UNIT CONTROLLER INTERFACE 99
FIG. 8-1 – CONNECTOR LOCATIONS 157

SECTION 1 – INTRODUCTION

LD13271

FIG. 1-1 – PACKAGED ROOFTOP AIR CONDITIONING UNIT

ECOLOGICAL AND ECONOMICAL DESIGN

- High Efficiency eco^2 rooftop units are optimized for HFC-410A refrigerant. YORK provides the FIRST standard product offering that meets the latest ASHRAE 90.1 energy efficiency requirements.
- **Cooling and Heating –** Superior operating performance provides lower operating costs. Smaller steps of cooling capacity provide tighter control of building environment and occupant comfort while optimizing energy efficiency.
- **Indoor Air Quality (IAQ) –** Outside air economizers provide energy savings in free cooling mode, and can provide a healthier and more comfortable building environment by introducing fresh outside air into the building as needed. Indoor Air Quality (IAQ) requirements for building ventilation and comfort are controlled through the microprocessor control panel.
- **Premium-Efficiency Motors –** Premium-efficiency motors are available for optimum energy efficiency. All motors used on the eco^2 packaged rooftop air conditioner meet U.S. EPACT 1992 minimum requirements.

  High-efficiency motors are standard. Motors are available in ODP or TEFC construction.

Condensing Section

- **Scroll Compressors –** Reliable, efficient, trouble-free operation is the true measure of a packaged rooftop's value. That's why YORK eco^2 Packaged Rooftop Air Conditioners use established scroll-compressor technology to deliver dependable, economical performance in a wide range of applications. With the eco^2 Packaged Rooftop, you get the latest generation of compressor enhancements added to the scroll's inherent strengths. The simplicity of a hermetic scroll compressor allows the use of fewer moving parts to minimize breakdown.
- **Multiple Compressor Staging –** Through the use of the scroll compressor, the eco^2 has the ability to stage it's cooling by enabling and disabling multiple single stage compressors on multiple circuits. These compressors are manifolded together in two independent circuits.
- **Compressor Circuiting –** The eco^2 is designed so that only 2 scroll compressors are in tandem within one refrigeration circuit. This means more reliable compressors, and less equipment down time. With multiple circuits, if a compressor should ever fail on one circuit, the other circuit/s will remain operational to work to maintain occupied loads. The eco^2 system has 2 circuits in the unit.

- **Compressor Sound Blankets –** Optional factory installed sound blankets can be installed to further reduce compressor sound attenuation.
- **Replaceable core filter driers –** The optional replaceable core filter driers on the eco^2 provides a convenient means for maintaining and optimizing the units refrigeration system. Eliminating additional field penetrations into the refrigerant circuit, which could lead to potential problems, reduce the worry of refrigerant circuit contamination.
- **Low Ambient Operation –** Head-pressure control is accomplished via a VFD motor controller rather than an inefficient and noisy condenser fan damper. By varying the speed of the condenser fan, better control and quieter operation is obtained during the colder months. Low ambient controls are available on all systems offering higher rooftop cooling capacity than competitive units.
- **Condenser Fan Motors –** The condenser fan motors used on the eco^2 unit are Totally Enclosed Air Over (TEAO) to provide maximum durability through any season.
- **Condenser Coils –** Are available in various materials and coatings to suit almost any type of application. Aluminum or copper fins, pre-coated or post-coated fins are available. The coating is applied using an epoxy coating on the aluminum coil. Each coil option is beneficial when the unit must operate under extreme conditions. The use of an epoxy coated coil is recommended for units installed in a corrosive environment.
- **Hot Gas By-pass –** Is standard on VAV units.
- **Condenser Coil Protection –** The eco^2 is available with a wire mesh guard for optimum coil protection.

Heating Section

- **Staged gas heat –** The eco^2 rooftop gas furnace is an induced-draft gas furnace designed for high efficiency and reliability. The furnace uses an aluminized steel tubular heat exchanger and operates at temperatures sufficient to prevent acidic exhaust gases from condensing in the heat exchanger at low fire rates, unlike drum and tube style furnaces that generate condensation formation. Up to three stages of heat are available.

  An optional stainless steel heat exchanger is also available.
- **Electric –** The eco^2 is also available with an electrical heater that can range from 40kW up to 50kW. Depending on the size of the heat required, the eco^2 can have 3 steps of control helping to provide tighter control of the supply and zone conditioned air. With the utilization of this multi step function, the eco^2 can effectively reduce energy consumption by bringing on smaller stages of heat while maintaining the maximum level of comfort.
- **Steam and Hot water –** This option will be available in the future.

AIR MANAGEMENT

- **DWDI Airfoil fans –** High efficiency fans are used to improve application flexibility, and address sound and application concerns.
- **Building pressure control –** Exhaust fans and barometric relief dampers are available to meet building pressure control requirements. Select the most appropriate option for a given application.
- **Low sound options –** Allow for application of the eco2 unit in sound-sensitive applications such as theaters and downtown areas. Contact JOHNSON CONTROLS for more details on site-specific requirements.
- **Variable Frequency Drives –** When a VAV unit is ordered, the eco2 comes standard with variable frequency drives (VFD's). The VFD can optimize a systems performance by modulating the supply fan motor speed to reduce energy consumption by as much as 40% while maximizing occupant comfort.
- **Fan Spring Isolation –** Two-inch spring isolation is used to prevent vibration transmission from the rooftop unit's supply fan to the building.

CONTROLS

- **Rooftop Controller -** The unit is designed to use the Simplicity Elite control. This control has been used with the 25 to 40 ton Millennium product for many years. The control is designed to operate with conventional room control input. This allows the same control to be used on installations requiring 25 to 60 tons of cooling.

  The board is equipped with four program buttons and two character displays for use by the technician. They allow for access to the most important board functions, current operating data, and current alarms as well as the last five alarms in the history memory buffer. The buttons and displays are also used to program the control with the correct configuration and set points.

  The control can also be connected to a computer for greater access to programming and operating information.

- **Communication -**The controller is designed to communicate using Modbus RTU protocol. Through the addition of a ModLINC translator, the unit can also communicate using BACnet MS/TP protocol.

INDOOR AIR QUALITY

- **Double Sloped Stainless Steel Drain Pan –** The eco^2's standard Stainless Steel drain pan meets ASHRAE 62 requirements for condensate drainage to improve indoor air quality. Solid wall liners encase insulation and prevent moisture damage. Additional benefits include easy cleanability and isolates insulation from conditioned airstream.
- **Double Wall Construction –** Is the standard construction of the eco^2 and incorporates powder coated pre-fabricated outer panels and corner post for maximum exterior surface protection.

- **Factory Shrinkwrap –** All eco^2 rooftop units can be ordered from the factory with an optional factory-fresh shrinkwrap packaging. This eliminates the contractors worries about dirt and debris clogging up condenser coils or moisture leaking into the air handler on the units way to the job site or rigging yard.
- **Demand Ventilation Option –** Can be incorporated into the unit to improve indoor air quality and help manage indoor pollutants such as CO_2 or other harmful airborne contaminates out of the occupied spaces for maximum comfort and safety. Activation of this sequence can easily be accomplished using a CO_2 sensor installed in the conditioned space. CO2 sensors are typically used with demand ventilation; however other sensors may be applied to control indoor contaminants such as volatile organic compounds (VOCs).
- **Smoke Purge –** Is also available to evacuate smoke due to fire from a room or zone.
- **Filtration –** The eco^2 is configured for various types of filtration to meet the different needs and requirements of today's rooftop applications, including 2-inch throwaway, pleated, carbon, and cleanable filters and 12-inch high efficiency rigid filters.

ELECTRICAL

- **Single Point Power –** The eco^2 unit comes standard with single point power connections to make installation quick and easy.
- **Dual Point Power –** Can be factory installed for applications that require the mechanical heating and cooling functions to be separated from the air handling functions. This enables the unit to be operated in an emergency condition while minimizing power consumption.
- **Unit-Mounted Disconnect –** Is available as an option to minimize time at installation of equipment and to reduce necessary field installed items.

SERVICE AND INSTALLATION

- **Access Doors –** Full-sized access doors provide easy access into the unit for routine maintenance and inspection.

  The unit can be purchased with a “Both Side Access” option for additional accessibility.
- **Service Valves –** Oversized service valves to provide isolation and quick reclamation and charging of system refrigerant are available as an option to minimize downtime and simplify the service and repair task.
- **Convenience Outlet –** For maintenance tasks requiring power tools, an optional 110V GFCI power supply can power lights, drills or any other power hand tool needed.
- **Factory Run-Tested –** Each unit is subjected to a series of quality assurance checks as well as an automated quality control process before being run-tested. Fans and drives are balanced at the factory during testing. The factory run-test ensures safe proper operation when the unit is installed, and reduces installation and commissioning time.
- **Gas Heat Sections –** Are factory and leaked checked.
- **Replaceable Core Filter Drier Option –** Provides a means to remove moisture, dirt and debris from the refrigeration circuit in the event it is opened.

SECTION 2 – INSTALLATION

APPROVALS

Designed certified by CSA, ETL, CETL as follows:

1. For use as a forced air furnace with cooling unit (gas heat models).
2. For outdoor installation only.
3. For installation on combustible material and may be installed directly on combustible flooring or Class A, Class B or Class C roof covering materials.
4. For use with natural gas or LP.
5. When used with LP propane gas one of the following conversion kits must be installed before the gas heat section is fired:

   375,000 BTU Input - 385-01866-001

   750,000 BTU Input - 385-01866-002

   1,125,000 BTU Input - 385-01866-003

Not suitable for use with conventional venting systems.

LIMITATIONS

The installation of this unit must conform to local building codes, or in the absence of local codes, with ANSI 223.1 Natural Fuel Gas Code and /or CAN/CGA B149 installation codes.

In U.S.A.:

1. National Electrical Code ANSI/NFPA No. 70 - Latest Edition.
2. National Fuel Gas Code Z223.1 - Latest Edition.
3. Gas-Fired Central Furnace Standard ANSI Z21.47 - Latest Edition.
4. Local gas utility requirements.

TABLE 2-1 – VOLTAGE LIMITATIONS

UNIT POWER SUPPLY	VOLTAGE VARIATIONS	
	MIN. VOLTS	MAX. VOLTS
575-3-60	518	632
480-3-60	415	506
230-3-60	207	253
200-3-60	187	228

Refer to Table 2-15 for airflow and entering air/ambient conditions limitations, and Table 2-1 for voltage limitations.

If the VAV boxes in the conditioned space have hydronic heating coils installed, it is the responsibility of the installing contractor to take appropriate measures to protect the hydronic coils against low unit supply air temperatures that could result in the freeze up and rupture of the coils.

UNIT INSPECTION

Immediately upon receiving the unit, it should be inspected for possible damage, which may have occurred during transit. If damage is evident, it should be noted in the carrier's freight bill. A written request for inspection by the carrier's agent should be made at once. *See "Instruction" manual, Form 50.15-NM for more information and details.*

To ensure warranty coverage, this equipment must be commissioned and serviced by an authorized JOHNSON CONTROLS service mechanic or a qualified service person experienced in packaged rooftop installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as relief valves, HP cut-out settings, design working pressures, and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panels. Before servicing, open and tag all disconnect switches.

LOCATIONS AND CLEARANCES

GENERAL

The eco^2 air conditioning units are designed for outdoor installation. When selecting a site for installation, be guided by the following conditions:

- Unit must be installed on a level surface.
- For the outdoor location of the unit, select a place having a minimum sun exposure and an adequate supply of fresh air for the condenser.

- Also avoid locations beneath windows or between structures.
- Optional condenser coil protection should be used for seashore locations or other harsh environments.
- The unit should be installed on a roof that is structurally strong enough to support the weight of the unit with a minimum of deflection. It is recommended that the unit(s) be installed not more than 15 feet from a main support beam to provide proper structural support and to minimize the transmission of sound and vibration. Ideally, the center of gravity should be located over a structural support or building column.
- Location of unit(s) should also be away from building flue stacks or exhaust ventilators to prevent possible reintroduction of contaminated air through the outside air intakes.
- Be sure the supporting structures will not obstruct the duct, gas or wiring connections.

LOCATION

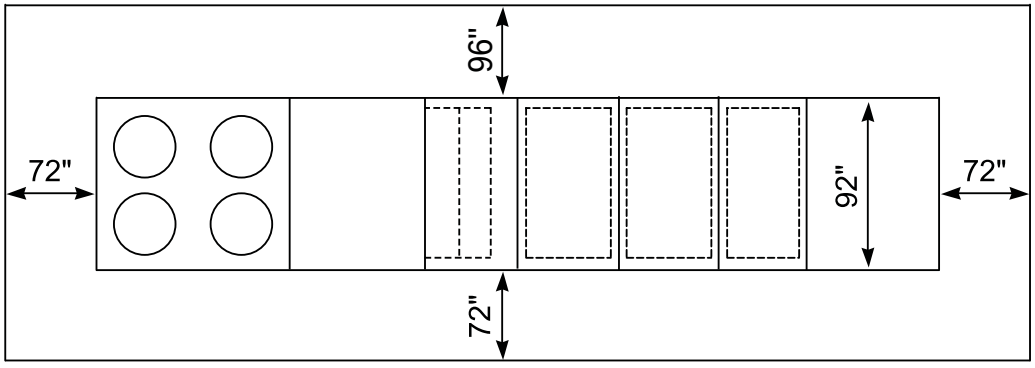
Of the many factors that can effect the location of equipment, some of the most important to consider are Structural, Acoustical and Service clearances. Proper attention should be made at the design stage to ensure proper structural support. In cases where equipment is being replaced, be aware of building design to insure support is adequate for the application.

The next most important consideration in applying roof top equipment is that of sound from the equipment. Special care should be made to keep the roof top unit away from sound sensitive areas such as conference rooms, auditoriums and executive offices and any other room that may have potential for tenant occupancy. Possible locations could be above hallways, mechanical or utility rooms.

Finally, service clearances should be maintained in rooftop design to insure safe access to the unit. Unit clearances are designed so that technicians have enough space between units, building walls, and edges of building to gain access safely. In cases where space is limited, please call your local York representative for additional information.

The clearances shown are to provide adequate condenser airflow and service access to inside the unit. Additional clearance should be considered for component replacement such as compressors, evaporator coils, and supply or exhaust fans.

While it is a common practice to operate the fan as soon as possible (air movement during construction) on the job site, the incomplete ductwork and missing diffuser grilles will greatly reduce air resistance and will allow the fan to operate beyond design parameters. This practice may result in water carry over and flooding of the unit. Also, the supply fan motor may overamp and become damaged.



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NOTES:

1. 10' clearance minimal over the top of the condensing unit.
2. Only one adjacent wall can exceed unit height.
3. 12' clearance required to adjacent units.
4. 8' service access recommended on one side.
5. Economizer and exhaust hoods, where applicable, are folded inside unit for shipment.
6. Dim. is to outside of lifting lugs.

FIG. 2-1 – UNIT CLEARANCES

RIGGING AND HANDLING

Proper rigging and handling of the equipment is mandatory during unloading and setting it into position to retain warranty status. All lifting lugs must be used to prevent twisting and damage to the unit.

Care must be taken to keep the unit in the upright position during rigging and to prevent damage to the water-tight seams in the unit casing. Avoid unnecessary jarring or rough handling.

Typical rigging using proper spreader bars and cables is shown in Figure 2-3. *See Figure 2-2 for number and location of the lifting lugs by unit size.* It is also mandatory that an experienced and reliable rigger be selected to handle unloading and final placement of the equipment. The rigger must be advised that the unit contains internal components and that it be handled in an upright position. Care must be exercised to avoid twisting the equipment structure.

Unit weights are listed under Table 2-2 in this manual. These weights must be referred to when selecting a crane for rigging and figuring roof weight loads. Contact your JOHNSON CONTROLS Sales Office if you have any questions regarding unit weights.

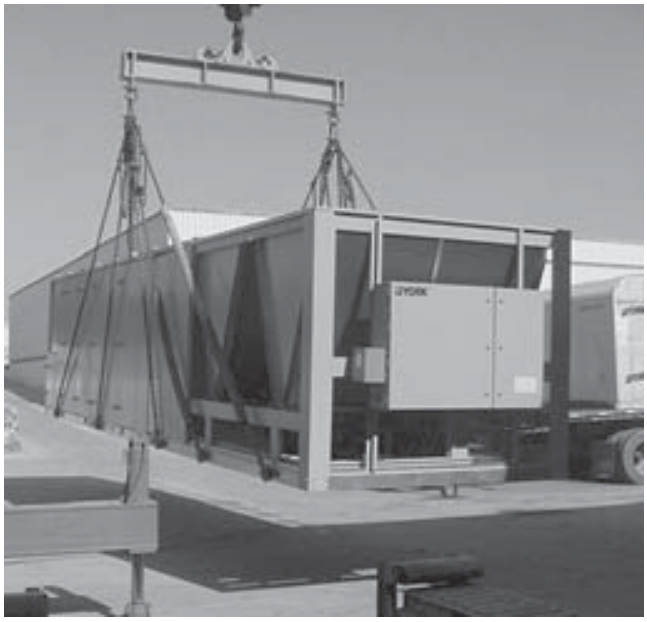

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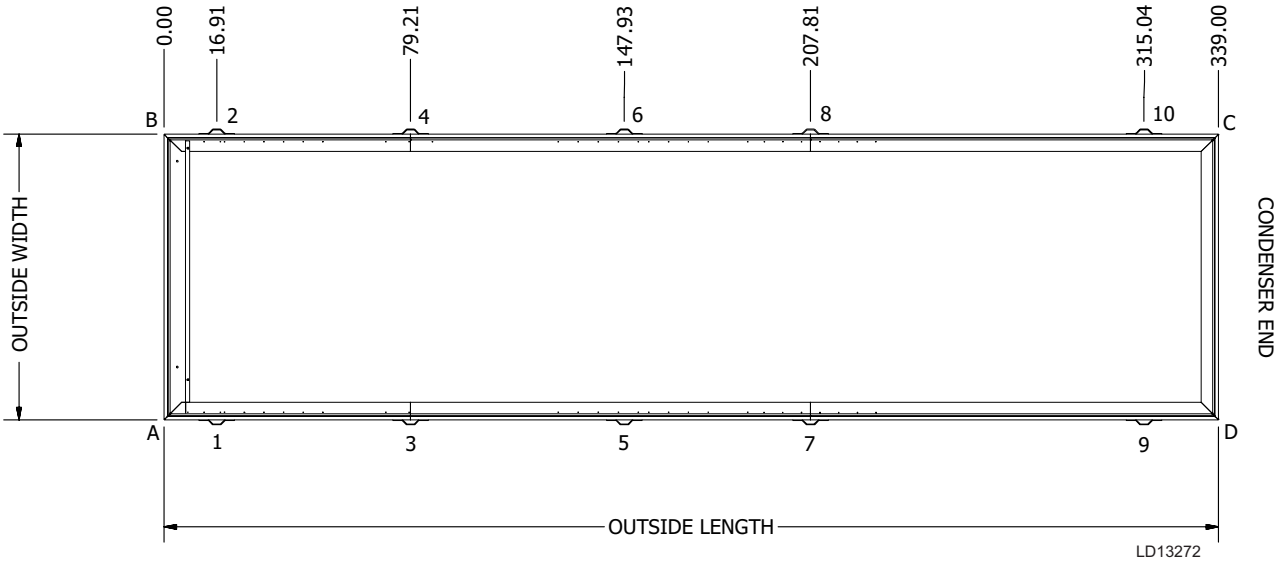
FIG. 2-3 – UNIT RIGGING



UNIT SIZE TONS	UNIT LENGTH INCHES	DIMENSION				
		1-2	3-4	5-6	7-8	9-10
50 - 61 STD CABINET	339	16.91	79.21	147.93	207.81	315.04

FIG. 2-2 – LIFTING LUG LOCATIONS

UNIT WEIGHTS

TABLE 2-2 – UNIT WEIGHTS - 050-061 MODELS

MODEL SIZE	050	051	060	061
BASIC UNIT*	7433	7433	7800	7819
ECONOMIZERS				
NO OUTSIDE AIR	240	240	240	240
25% OUTSIDE AIR FIXED POSITION MAUAL DAMPER	446	446	446	446
25% OUTSIDE AIR 2 POSITION ACTUATED DAMPER	476	476	476	476
FULL MODULATION WITH MINIMUM POSITION	476	476	476	476
POWER EXHAUSTS				
FAN, MOTOR, MODULATING DAMPER AND HOOD	501	501	501	501
FAN, MOTOR, VFD, BAROMETRIC DAMPER AND HOOD	506	506	506	506
GAS HEAT				
375 MBH	162	162	162	162
750 MBH	324	324	324	324
1125 MBH	486	486	486	486
OPTIONS				
OPEN PERIMETER CURB	544	544	544	544
CONDENSER COIL WIRE GUARD	64	64	64	64
COPPER CONDENSER COILS (ADDITIONAL)	516	516	773	773
12” RIGID FILTERS (ADDITIONAL)	319	319	319	319

*UNIT INCLUDES FC FAN W/ 20 HP MOTOR, VFD AND 2” THROWAWAY FILTERS

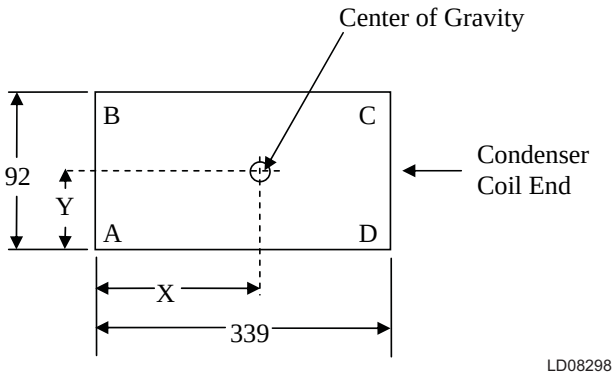


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TABLE 2-3 – UNIT CENTER OF GRAVITY

MODEL	050		051	
	X	Y	X	Y
BASIC UNIT	184.1	50.2	184.1	50.2
BASIC UNIT W/ ECON.	191.0	49.9	191.0	49.9
BASIC UNIT W/ ECON. & HEATING	187.4	50.0	187.4	50.0
BASIC UNIT W/ ECON. & HEATING & POWER EXHAUST	194.9	49.5	194.9	49.5
MODEL	**060**		**061**	
	X	Y	X	Y
BASIC UNIT	179.8	49.9	179.6	50.0
BASIC UNIT W/ ECON.	186.7	49.7	186.5	49.7
BASIC UNIT W/ ECON. & HEATING	183.5	49.8	183.2	49.8
BASIC UNIT W/ ECON. & HEATING & POWER EXHAUST	190.9	49.3	190.7	49.3

UNIT WEIGHTS (CONTINUED)

TABLE 2-4 – UNIT CORNER WEIGHTS - 050-061 MODELS

MODEL	050				051			
	A	B	C	D	A	B	C	D
BASIC UNIT	1835	2201	1852	1545	1835	2201	1852	1545
BASIC UNIT W/ ECON.	2039	2417	1873	1580	2039	2417	1873	1580
BASIC UNIT W/ ECON. & HEATING	2118	2521	2041	1715	2118	2521	2041	1715
BASIC UNIT W/ ECON. & HEATING & POWER EXHAUST	2366	2751	2034	1750	2366	2751	2034	1750

MODEL	060				061			
	A	B	C	D	A	B	C	D
BASIC UNIT	1894	2244	1986	1676	1893	2250	1997	1680
BASIC UNIT W/ ECON.	2097	2461	2008	1711	2096	2466	2018	1715
BASIC UNIT W/ ECON. & HEATING	2177	2565	2175	1846	2176	2570	2185	1850
BASIC UNIT W/ ECON. & HEATING & POWER EXHAUST	2424	2795	2168	1881	2423	2801	2178	1885

Unit Placement

- **Elevated –** Elevated roof curbs or dunnage steel can be used to support the unit in order to raise it to specific heights. When this type of placement is required, be sure to keep unit access in mind. Cat walks or other forms of unit access may be required to one or both sides of the unit, depending on your area of the country and the local codes that are enforced. Please check with local officials to ensure the application conforms to local codes and regulations.

- **Ground Level Locations –** It is important that the units be installed on a substantial base that will not settle, causing strain on the refrigerant lines and sheet metal and resulting in possible leaks. A one piece concrete slab with footers extended below the frost line is highly recommended. Additionally, the slab should be isolated from the main building foundation to prevent noise and vibration transmission to the building structure.

  For ground level installations, precautions should be taken to protect the unit from tampering by, or injury to, unauthorized persons. Erecting a fence around the unit is common practice.

ROOF CURB INSTALLATION

YORK offers an optional roof curb designed specifically for the eco2 foot print. This curb comes as an open condenser model and is shipped disassembled and requires field assembly during installation. *Refer to the Installation Manual that is shipped with the roof curb for specific instructions.* For bottom supply and return openings, the curb has matching connections to ease installation.

The curb should be located according to the location recommendations above, and properly sealed to prevent moisture and air leakage into and out of the duct system. Flexible collars should be used when connecting the duct work to prevent unit noise transmission and vibration into the building. The roof curb drawings contained in the Johnson Controls literature are not intended as construction documents for field fabrication of a roof curb. Johnson Controls will not be responsible for the unit fit up, leak integrity, or sound level with field fabricated roof curbs.

Construction documents for field fabricated roof curbs are available upon request.

Wood or fiber cant strips, roofing felts, roofing material, caulking and curb-to-roof fasteners are to be field supplied.

PHYSICAL DATA

TABLE 2-5 – PHYSICAL DATA – 050-061 MODELS

UNIT SIZE	050	051	060	061
GENERAL DATA				
LENGTH WITHOUT HOOD (INCHES)	339	339	339	339
WIDTH (INCHES)	92	92	92	92
HEIGHT (INCHES)	82	82	82	82
UNIT EER/ IPLV	10.3 / 10.9	10.2 / 10.6	10.1 / 10.4	10.1 / 10.3
UNIT EER/ IPV GAS HEAT				
COMPRESSOR DATA (*SEE TABLE 2-6)*				
QUANTITY	4	4	4	4
TYPE	SCROLL	SCROLL	SCROLL	SCROLL
UNIT CAPACITY STEPS	4	4	4	4
REFRIGERANT (410A)				
SYSTEM 1	50 lbs - 0 oz	50 lbs - 0 oz	58 lbs - 11 oz	58 lbs - 11 oz
SYSTEM 2	50 lbs - 0 oz	50 lbs - 0 oz	58 lbs - 11 oz	58 lbs - 11 ozs
SUPPLY FAN				
QUANTITY	1	1	1	1
TYPE	FC	FC	FC	FC
SIZE	28 - 28	28 - 28	28 - 28	28 - 28
MOTOR SIZE RANGE (HP)	10 - 40	10 - 40	10 - 40	10 - 40
AIR FLOW RANGE (CFM) COOLING MIN.	10,000 - 22,500	10,000 - 22,500	12,500 - 24,000	10,000 - 24,000
STATIC PRESSURE RANGE (TOTAL)	1.0” - 6.0”	1.0” - 6.0”	1.0” - 6.0”	1.0” - 6.0”
OPTIONAL SUPPLY FAN				
QUANTITY	1	1	1	1
TYPE	AF	AF	AF	AF
SIZE	28	28	28	28
MOTOR SIZE RANGE (HP)	10 - 40	10 - 40	10 - 40	10 - 40
AIR FLOW RANGE (CFM) COOLING MIN.	10,000 - 22,500	10,000 - 22,500	10,000 - 24,000	10,000 - 24,000
STATIC PRESSURE RANGE (TOTAL)	1.0” - 8.0”	1.0” - 8.0”	1.0” - 8.0”	1.0” - 8.0”
EXHAUST FAN				
QUANTITY FANS/MOTORS	2 / 1	2 / 1	2 / 1	2 / 1
TYPE	FC	FC	FC	FC
SIZE	18 - 18	18 - 18	18 - 18	18 - 18
MOTOR SIZE RANGE (HP)	5 - 20	5 - 20	5 - 20	5 - 20
AIR FLOW RANGE (CFM)	4,000 - 22,500	4,000 - 22,500	4,000 - 24,000	4,000 - 24,000
STATIC PRESSURE RANGE (TOTAL)	0.1” - 1.5”	0.1” - 1.5”	0.1” - 1.5”	0.1” - 1.5”
EVAPORATOR COIL				
SIZE (SQUARE FEET)	52	52	52	52
ROWS/FPI	3 / 17	3 / 17	4 / 17	4 / 17
CONDENSER COIL				
SIZE (SQUARE FEET)	88	88	88	88
ROWS/FPI	2 / 17	2 / 17	3 / 17	3 / 17
CONDENSER FANS				
QUANTITY	4	4	4	4
TYPE	PROP.	PROP.	PROP.	PROP.
DIAMETER (INCHES)	36	36	36	36
MOTOR HP	2	2	2	2
FILTERS - 2” THROWAWAY (PRE-FILTER POSITION)				
QUANTITY	8 / 12	8 / 12	8 / 12	8 / 12
SIZE (LENGTH X WIDTH) (IN.)	25X16 / 25X20	25X16 / 25X20	25X16 / 25X20	25X16 / 25X20
TOTAL FILTER FACE AREA (SQUARE FEET)	61.6	61.6	61.6	61.6
FILTERS - 2” CLEANABLE (PRE-FILTER POSITION)				
QUANTITY	8 / 12	8 / 12	8 / 12	8 / 12
SIZE (LENGTH X WIDTH) (IN.)	25X16 / 25X20	25X16 / 25X20	25X16 / 25X20	25X16 / 25X20
TOTAL FILTER FACE AREA (SQUARE FEET)	63.9	63.9	63.9	63.9

PHYSICAL DATA (CONTINUED)

TABLE 2-5 – PHYSICAL DATA - 050-061 MODELS (CONTINUED)

UNIT SIZE		050	051	060	061
FILTERS - 2" PLEATED, 30% EFFICIENT (PRE-FILTER POSITION)					
QUANTITY		8 / 12	8 / 12	8 / 12	8 / 12
SIZE (LENGTH X WIDTH) (IN.)		25X16 / 25X20	25X16 / 25X20	25X16 / 25X20	25X16 / 25X20
TOTAL FILTER FACE AREA (SQUARE FEET)		63.9	63.9	63.9	63.9
FILTERS -12" RIGID 65%, 2" 30% PREFILTER (PRE-FILTER POSITION)					
QUANTITY		1 / 4 / 9	1 / 4 / 9	1 / 4 / 9	1 / 4 / 9
SIZE (LENGTH X WIDTH) (IN.)		16X20/25X16/ 25X20	16X20/25X16/ 25X20	16X20/25X16/ 25X20	16X20/25X16/ 25X20
TOTAL FILTER FACE AREA (SQUARE FEET)		43.0	43.0	43.0	43.0
FILTERS -12" RIGID 95%, 2" 30% PREFILTER (PRE-FILTER POSITION)					
QUANTITY		1 / 4 / 9	1 / 4 / 9	1 / 4 / 9	1 / 4 / 9
SIZE (LENGTH X WIDTH) (IN.)		16X20/25X16/ 25X20	16X20/25X16/ 25X20	16X20/25X16/ 25X20	16X20/25X16/ 25X20
TOTAL FILTER FACE AREA (SQUARE FEET)		44.6	44.6	44.6	44.6
FILTERS - 2" CARBON (PRE-FILTER POSITION)					
QUANTITY		8 / 12	8 / 12	8 / 12	8 / 12
SIZE (LENGTH X WIDTH) (IN.)		25X16 / 25X20	25X16 / 25X20	25X16 / 25X20	25X16 / 25X20
TOTAL FILTER FACE AREA (SQUARE FEET)		63.9	63.9	63.9	63.9
FILTERS - 12" RIGID 95% IN POST-FILTER POSITION					
QUANTITY		1 / 3 / 9	1 / 3 / 9	1 / 3 / 9	1 / 3 / 9
SIZE (LENGTH X WIDTH) (IN.)		16X20/25X16/ 25X20	16X20/25X16/ 25X20	16X20/25X16/ 25X20	16X20/25X16/ 25X20
TOTAL FILTER FACE AREA (SQUARE FEET)		41.8	41.8	41.8	41.8
GAS FURNACES					
STAGED FURNACE SIZES (INPUT/OUTPUT/STEPS)		375 MBH / 300 MBH / 1 STEP			
		750 MBH / 600 MBH / 2 STEPS			
		1125 MBH / 900 MBH / 3 STEPS			
GAS PRESSURE RANGE		4.5-13.5" WC	4.5-13.5" WC	4.5-13.5" WC	4.5-13.5" WC
AIRFLOW RANGE (MIN HEATING)	375 MBH	7,500	7,500	11,500	11,500
	750 MBH	14,000	14,000	14,000	14,000
	1125 MBH	21,000	21,000	21,000	21,000
MINIMUM OA TEMP FOR MECH. CIG.		40.0 °F	40.0 °F	40.0 °F	40.0 °F
LOW AMBIENT OPTION MIN. OA TEMP		0.0 °F	0.0 °F	0.0 °F	0.0 °F

TABLE 2-6 – PHYSICAL DATA - COMPRESSORS

		COMPRESSORS UTILIZED				COMPRESSOR NOMINAL TONS				CAPACITY %			
		SYSTEM 1		SYSTEM 2		SYSTEM 1		SYSTEM 2					
		"COMPR # 1"	"COMPR # 2"	"COMPR # 3"	"COMPR # 4"	"COMPR # 1"	"COMPR # 2"	"COMPR # 3"	"COMPR # 4"	"STAGE 1"	"STAGE 2"	"STAGE 3"	"STAGE 4"
MODEL	050	ZP137	ZP120	ZP137	ZP120	13.58	12.53	13.58	12.53	26.0	52.0	76.0	100.0
	051	ZP137	ZP137	ZP137	ZP137	13.58	13.58	13.58	13.58	25.0	50.0	75.0	100.0
	060	ZP182	ZP137	ZP182	ZP137	17.95	13.30	17.95	13.30	28.7	57.4	78.7	100.0
	061	ZP182	ZP137	ZP182	ZP154	17.95	13.30	17.60	14.86	28.2	55.8	76.7	100.0

GENERAL ARRANGEMENT DRAWING – 050-061 MODELS

BOTTOM SUPPLY / BOTTOM RETURN

SECTION DESCRIPTIONS:

EE = Economizer
FE = Fan Exhaust
F = Filter Segments
CC = Cooling Coils
FS = Supply Fan
DP = Discharge Plenum
CO = Condenser Section

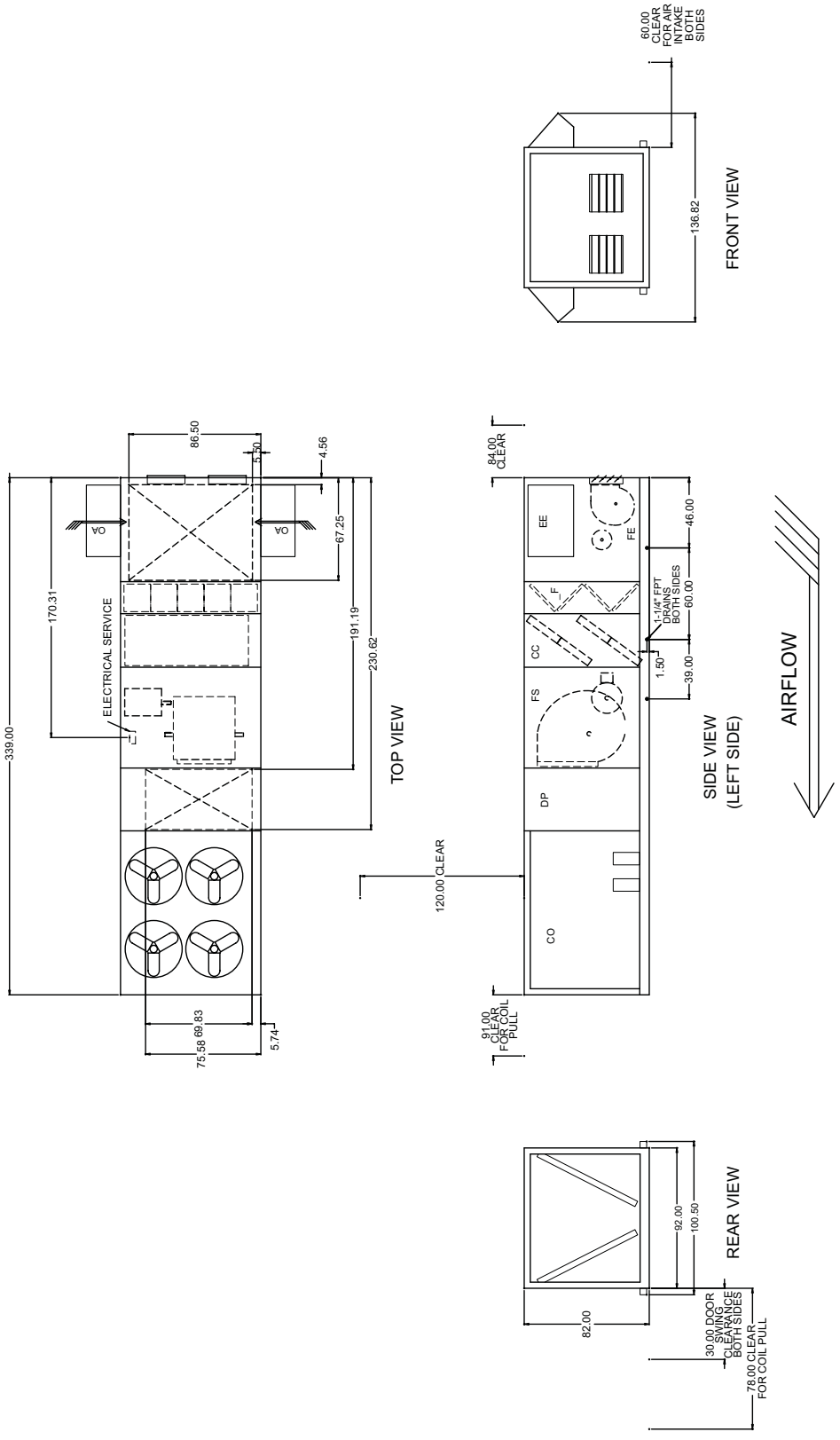


FIG. 2-4 – GENERAL ARRANGEMENT DRAWING

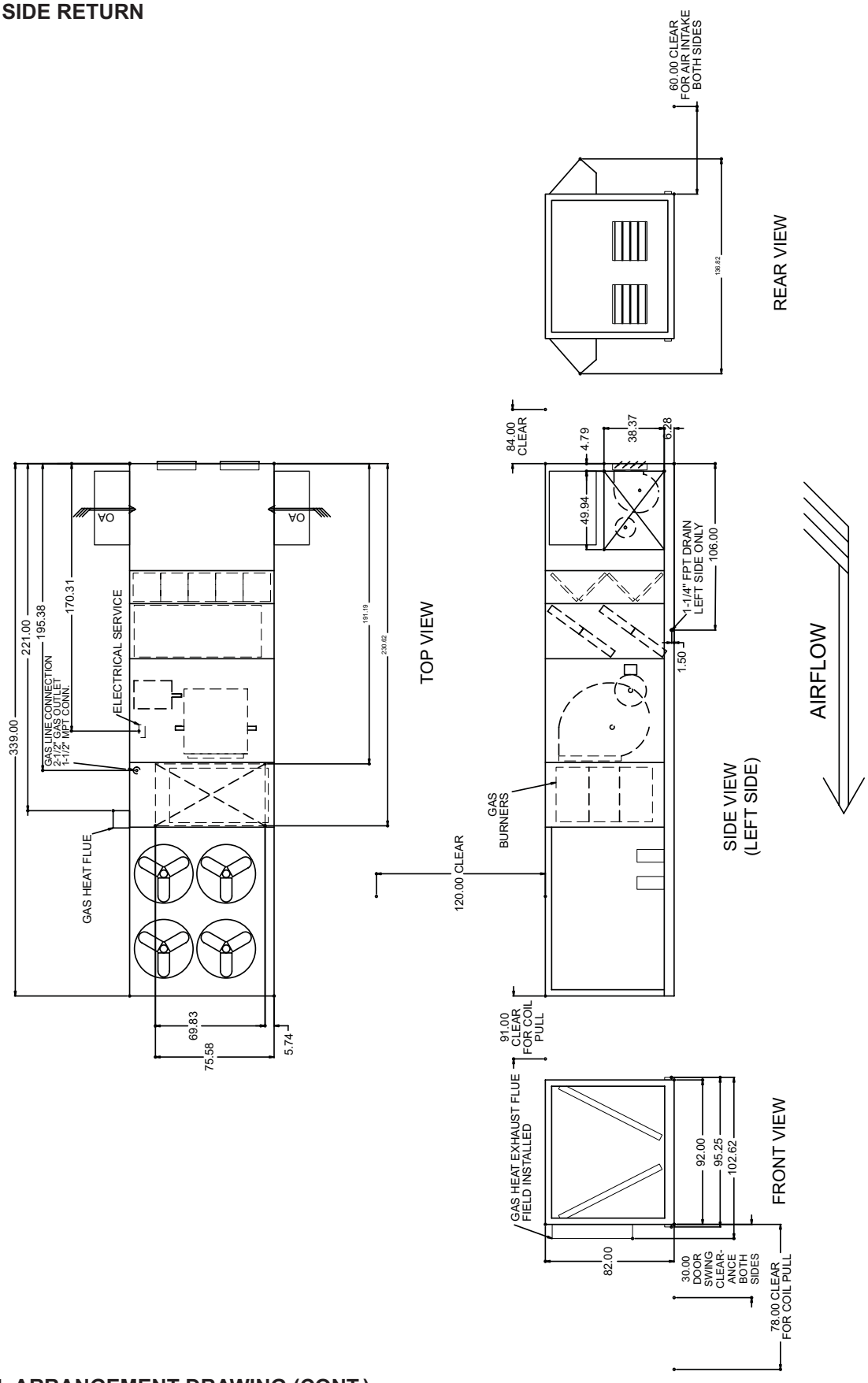
LD08295

GENERAL ARRANGEMENT DRAWINGS (CONTINUED)

BOTTOM SUPPLY / SIDE RETURN

SECTION DESCRIPTIONS:

EE = Economizer
FE = Fan Exhaust
_F = Filter Segments
CC = Cooling Coils
FS = Supply Fan
DP = Discharge Plenum
CO = Condenser Section



NOTES:

1. 10' clearance minimal over the top of the condensing unit.
2. Only one adjacent wall can exceed unit height.
3. 12' clearance required to adjacent units.
4. 8' service access recommended on one side.
5. Economizer and exhaust hoods, where applicable are folded inside unit for shipment.

FIG. 2-4 – GENERAL ARRANGEMENT DRAWING (CONT.)

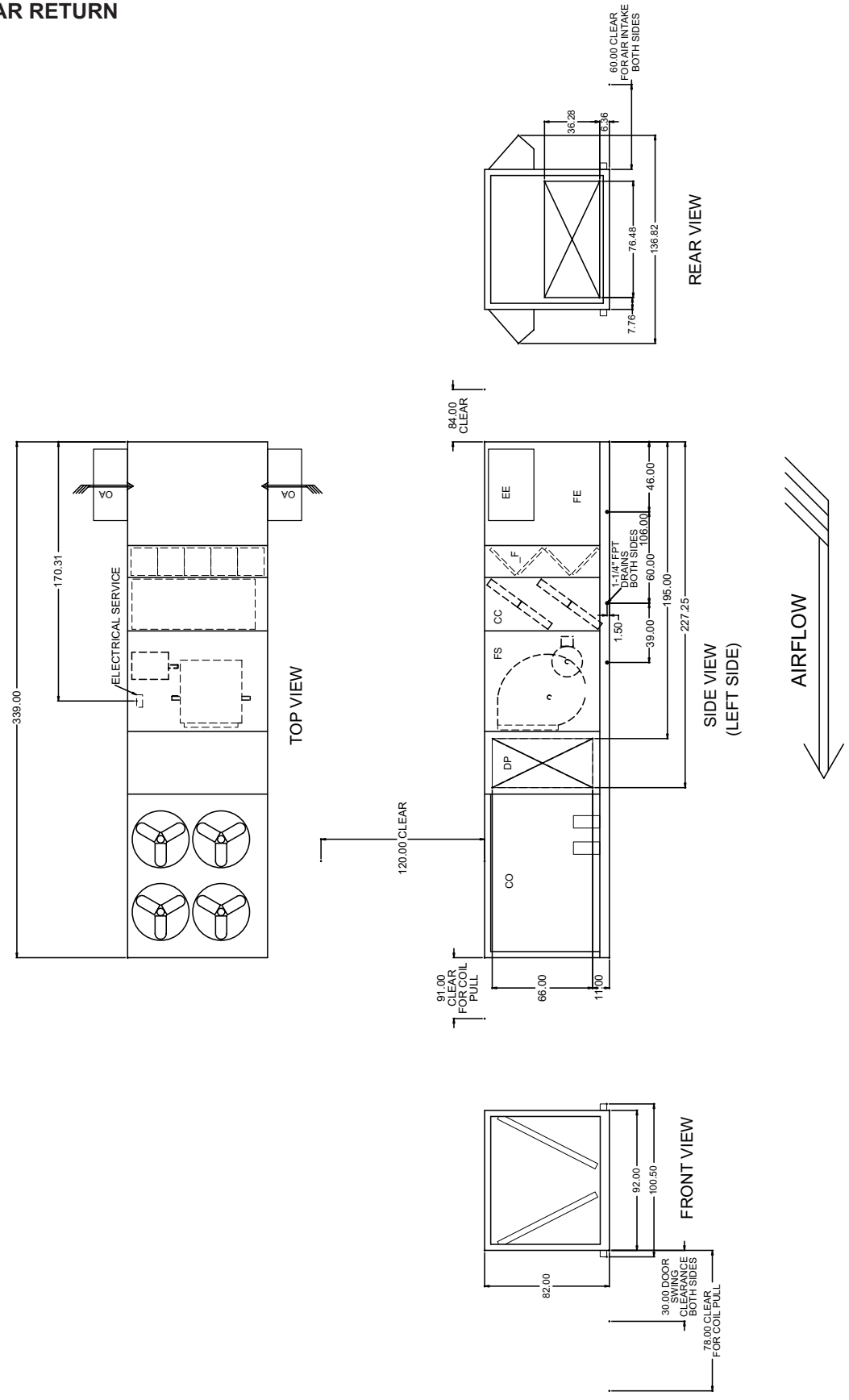
LD08370

GENERAL ARRANGEMENT DRAWINGS (CONTINUED)

BOTTOM SUPPLY / REAR RETURN

SECTION DESCRIPTIONS:

EE = Economizer
FE = Fan Exhaust
F = Filter Segments
CC = Cooling Coils
FS = Supply Fan
DP = Discharge Plenum
CO = Condenser Section



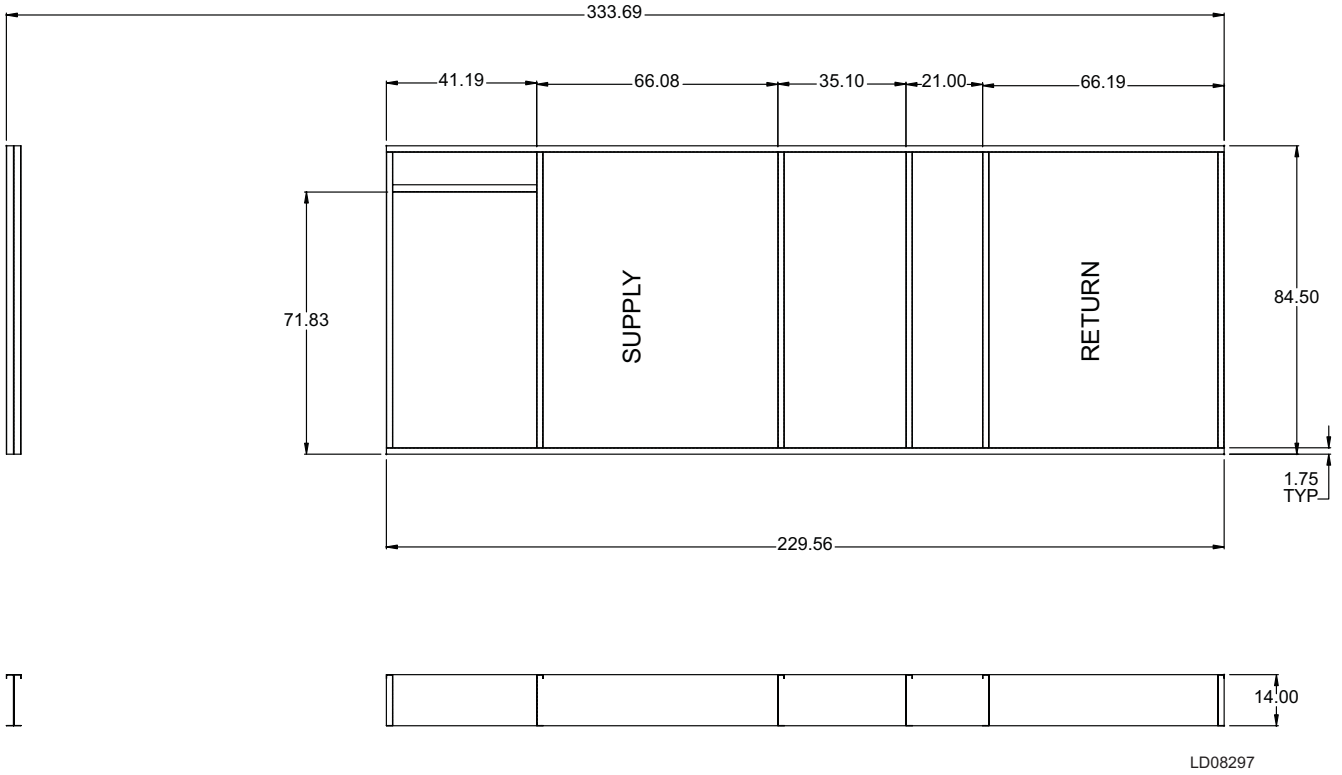
NOTES:

1. 10' clearance minimal over the top of the condensing unit.
2. Only one adjacent wall can exceed unit height.
3. 12' clearance required to adjacent units.
4. 8' service access recommended on one side.
5. Economizer and exhaust hoods, where applicable are folded inside unit for shipment.

LD08296

FIG. 2-4 – GENERAL ARRANGEMENT DRAWING (CONT.)

CURB LAYOUT DRAWING / 050-061 MODELS



NOTES:

1. Unit must be installed square and level.
2. Curb configuration for “bottom” return and “bottom” supply.
3, These drawings are not intended as construction documents for the field fabricated roof curbs. Johnson Controls will not be responsible for the unit fit up, leak integrity, or sound level for installation using field fabricated roof curbs.
4. The YPAL unit does not have a base pan under the condensing section of the unit. Field fabricated roof curbs must have a cap on the top of the condensing section of the curb to prevent moisture from entering the space. The cap design must be sloped away from the supply duct opening to the end of the unit for the drainage of the moisture off of the top of the cap.

FIG. 2-5 – GENERAL ARRANGEMENT DRAWING

ELECTRICAL DATA

ELECTRICAL SERVICE SIZING

In order to use the electrical service required for the cooling only eco2 rooftop, use the appropriate calculations listed below from U.L. 1995. Based on the configuration of the rooftop, the calculations will yield different MCA (minimum circuit ampacity), and MOP (maximum overcurrent protection).

Using the following load definitions and calculations, determine the correct electrical sizing for your unit. All concurrent load conditions must be considered in the calculations, and you must use the highest value for any combination of loads.

Load Definitions:

- **LOAD1** is the current of the largest motor – compressor or fan motor.
- **LOAD2** is the sum of the remaining motor currents that may run concurrently with LOAD1.
- **LOAD3** is the current of the electric heaters – zero for cooling only units.
- **LOAD4** is the sum of any remaining currents greater than or equal to 1.0 amp.

Use the following calculations to determine MCA and MOP for units supplied with a single-point power connection:

MCA = (1.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

If the MOP does not equal a standard current rating of an overcurrent protective device, then the marked maximum rating is to be the next lower standard rating. However, if the device selected for MOP is less than the MCA, then select the lowest standard maximum fuse size greater than or equal to the MCA.

TABLE 2-7 – COMPRESSOR DATA - R410A

MODEL		MODEL	NOMINAL VOLTAGE					
			208-230/3/60		460/3/60		575/3/60	
			RLA*	LRA	RLA*	LRA	RLA*	LRA
050	1A	ZP120	33.3	239	17.9	125	12.8	80
	1B	ZP137	48.0	245	18.6	125	14.7	100
	2A	ZP121	33.3	239	17.9	125	12.8	80
	2B	ZP137	48.0	245	18.6	125	14.7	100
051	1A	ZP137	48.0	245	18.6	125	14.7	100
	1B	ZP137	48.0	245	18.6	125	14.7	100
	2A	ZP137	48.0	245	18.6	125	14.7	100
	2B	ZP137	48.0	245	18.6	125	14.7	100
060	1A	ZP137	48.0	245	18.6	125	14.7	100
	1B	ZP182	55.7	340	26.9	172	23.7	132
	2A	ZP137	48.0	245	18.6	125	14.7	100
	2B	ZP182	55.7	340	26.9	172	23.7	132
061	1A	ZP154	51.3	300	22.4	150	19.8	109
	1B	ZP182	55.7	340	25.0	172	23.7	132
	2A	ZP137	48.0	245	18.6	125	14.7	100
	2B	ZP182	55.7	340	25.0	172	23.7	132

TABLE 2-8 – POWER SUPPLY VOLTAGE LIMITS

POWER SUPPLY	MINIMUM VOLTAGE	MAXIMUM VOLTAGE
208/230V/3PH/60HZ	187	253
460V/3PH/60HZ	414	506
575V/3PH/60HZ	518	632

ELECTRIC DATA (CONTINUED)

TABLE 2-9 – SUPPLY AND EXHAUST FAN MOTOR DATA - ODP

HIGH EFFICIENCY					
MOTOR HP	NOMINAL VOLTAGE				
	208/3/60	230/3/60	380/3/60	460/3/60	575/3/60
	FLA	FLA	FLA	FLA	FLA
5	14.0	13.8	8.3	6.9	5.3
7.5	21.7	20.0	13.3	10.0	8.2
10	28.2	26.0	17.5	13.0	11.0
15	41.0	38.0	24.5	19.0	16.2
20	53.0	48.0	32.0	24.0	19.8
25	66.0	62.0	39.0	31.0	23.8
30	84.0	72.0	46.0	36.0	29.0
40	106.0	98.0	59.0	49.0	38.8

PREMIUM EFFICIENCY				
MOTOR HP	NOMINAL VOLTAGE			
	208/3/60	230/3/60	460/3/60	575/3/60
	FLA	FLA	FLA	FLA
5	13.8	13.2	6.6	5.2
7.5	20.0	19.4	9.7	7.4
10	26.0	25.0	12.5	10.3
15	37.4	35.4	17.7	14.1
20	49.4	47.0	23.5	18.9
25	63.3	60.0	30.0	24.2
30	74.1	70.0	35.0	28.0
40	97.5	92.0	46.0	37.4

TABLE 2-10 – SUPPLY AND EXHAUST FAN MOTOR DATA - TEFC

HIGH EFFICIENCY					
MOTOR HP	NOMINAL VOLTAGE				
	208/3/60	230/3/60	380/3/60	460/3/60	575/3/60
	FLA	FLA	FLA	FLA	FLA
5	15.4	14.2	8.1	7.1	5.4
7.5	21.2	19.6	12.0	9.8	8.2
10	27.5	25.6	16.8	12.8	11.4
15	40.0	37.0	23.8	18.5	15.3
20	54.0	50.0	30.0	25.0	19.1
25	64.0	60.0	39.0	30.0	25.0
30	78.0	72.0	46.0	36.0	29.6
40	101.0	94.0	57.0	47.0	38.0

PREMIUM EFFICIENCY				
MOTOR HP	NOMINAL VOLTAGE			
	208/3/60	230/3/60	460/3/60	575/3/60
	FLA	FLA	FLA	FLA
5	13.6	13.0	6.5	5.2
7.5	21.0	18.8	9.4	8.0
10	26.0	25.0	12.5	10.0
15	38.9	37.0	18.5	14.8
20	51.0	48.0	24.0	19.0
25	63.3	60.0	30.0	23.9
30	77.0	72.0	36.0	29.0
40	99.0	92.0	46.0	36.8

TABLE 2-11 – CONDENSER FAN MOTOR RLA - STANDARD FAN

RLA EACH MOTOR		208V/3PH/60HZ	230V/3PH/60HZ	460V/3PH/60HZ	575V/3PH/60HZ
		7.3	6.2	3.1	2.5
MODEL	QUANTITY OF FANS	208V/3PH/60HZ	230V/3PH/60HZ	460V/3PH/60HZ	575V/3PH/60HZ
50-61 TONS	4	29.2	24.8	12.4	10.0

TABLE 2-12 – CONDENSER FAN MOTOR RLA - LOW SOUND FAN (FUTURE OPTION)

RLA EACH MOTOR		208V/3PH/60HZ	230V/3PH/60HZ	460V/3PH/60HZ	575V/3PH/60HZ
		7.3	6.2	3.1	2.5
MODEL	QUANTITY OF FANS	208V/3PH/60HZ	230V/3PH/60HZ	460V/3PH/60HZ	575V/3PH/60HZ
50-61 TONS	4	32.4	27.6	13.6	12.0

TABLE 2-13 – MISCELLANEOUS ELECTRICAL DATA

DESCRIPTION	NOMINAL VOLTAGE			
	208 / 230V	460V	575V	380V-60
	AMPS	AMPS	AMPS	AMPS
CONTRL X'FMR. 500 VA	2.4	1.1	0.9	2
CONVENIENCE OUTLET	9.6	4.4	3.5	N/A
GAS HEAT	9.6	4.4	3.5	5.3

ELECTRIC DATA (CONTINUED)

TABLE 2-14 – ELECTRIC HEAT

KW	NOMINAL VOLTAGE			
	208/3/60 AMPS	230/3/60 AMPS	460/3/60 AMPS	575/3/60 AMPS
40	96	96	48	40
80	193	193	96	80
108	260	260	130	109
150	—	—	181	151

TABLE 2-15 – AIRFLOW AND ENTERING AIR/AMBIENT LIMITATIONS

Limitations	Model Size			
	50	51	60	61
Minimum Airflow at Standard Design Conditions. CFM* (min to max)	10000 - 22500	10000 - 22500	12500 - 24000	12500 - 24000
Entering Wet Bulb Temp F° (min/max)	57/75	57/75	57/75	57/75
Entering Dry Bulb Temp F° (min/max)	68/90	68/90	68/90	68/90
Ambient Temp F° without Low Amb option	50/120	50/120	50/120	50/120
Ambient Temp F° with Low Amb option	0/120	0/120	0/120	0/120

* Cooling Only Units

FILTERS

Two-inch "throwaway" filters are standard and factory installed in a filter rack located prior to the evaporator coil. Any optional pre-filters ordered with the unit will be shipped inside the unit, but must be field installed. The unit can also be ordered with an extended cabinet and 95% efficient post-filters. These post-filters are installed at the factory.

Pre-filters must always be installed ahead of the evaporator coil. Post and pre-filters must be kept clean and replaced with the same size and type as shipped with the unit. Dirty filters will reduce the capacity of the unit and may result in frosted coils and safety shutdowns. Required filter sizes and quantities are shown in Table 2-6. The unit should never be operated for any length of time without the proper filters installed in the unit.

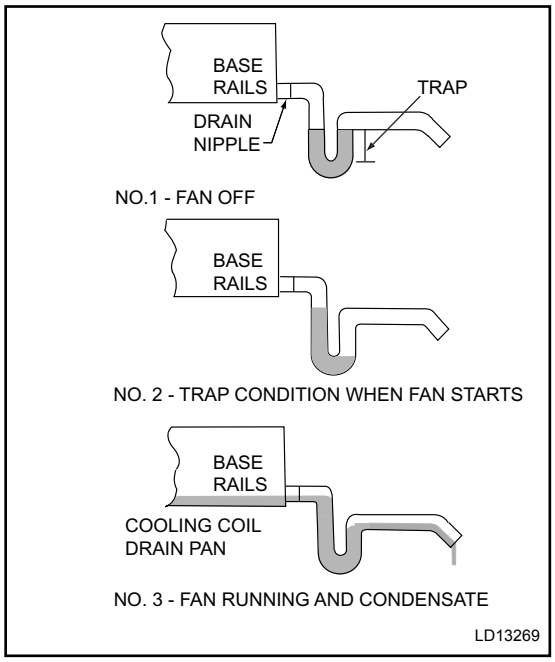


FIG. 2-6 – DRAIN TRAP SHOWING WATER LOCATION DURING DRAW THROUGH OPERATION STAGES

CONDENSATE DRAIN

Condensate Drain Piping

The eco [2] cooling coils are located in the units so that the supply air is drawn through them. This results in the condensate being subjected to negative (-) static pressure. Unless some means of pressure equalization is provided in the condensate drains, the air rushing back through the drainpipe will cause the condensate to build up in the base rails. As the unit continues to operate, the accumulated water will be carried with the air stream, overfilling the base rails causing possible water leaks into the supply duct and/or causing water damage in the building. A trap must be installed to prevent this condensate water build-up (*see Figures 2-6 & 2-7*).

Under high latent load conditions condensate may form in the base and side rails of the unit. The unit is designed to contain this moisture and prevent it from leaking into the conditioned space. In order to dispose of this condensate, two condensate drain connections are located on the side rails on each side of the unit and in the base rail on the return end of the unit. There are five (5) condensate drains on the unit. Since these connections are also under negative pressure, they must be trapped using the same design criteria as the main drain pan.

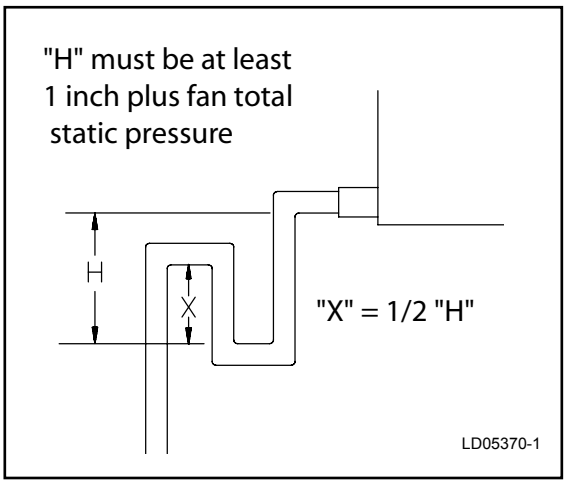
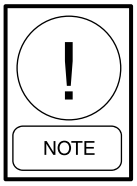


FIG. 2-7 – TRAP DETAIL FOR DRAW THROUGH APPLICATION

Condensate Drain Trap

For *"Draw-through"* applications install a trapped condensate drain line at unit drain connection (*see Figure 2-7* according to all governing codes. "H" dimension must be at least 1 inch greater than design Total Static Pressure (TSP) of fan.

The trap and drain lines should be protected from freezing. Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install condensate drain lines from the 1-1/4 inch NPT female connections on the unit to an open drain.



The unit must be properly trapped and charged with water before the units are started.

AIR HOODS FOR ECONOMIZER

There are two (2) economizer outside air intake hoods provided with the unit. The front and rear hoods are made operational per the following instructions:

- Remove the screws holding the economizer hood shipping covers in place. Discard covers.
- Apply a bead of RTV sealer along the edge of both hoods and each pivot joint to prevent water leakage.
- Rotate the hoods out (each hood is hinged). Secure the hoods with screws along the top and sides.
- Seal any unused screw holes with RTV or by replacing the screw.

AIR HOODS FOR FIXED OUTSIDE AIR (UNITS WITHOUT ECONOMIZER)

The hoods must be installed per the above instructions. The dampers may be adjusted by loosening the thumb screw, turning the lever to the desired position, and retightening the thumb screw.

AIR HOODS FOR EXHAUST AIR

No hoods are required for the exhaust air outlet.

FIELD WIRING

Figure 2-8 shows the field wiring to the Simplicity control board. All field control wiring is field supplied and installed.

Thermostat

A thermostat (4 stage cool and 3 stage heat) can be used on CV and VAV units. On CV units the thermostat is the primary means of control for the unit. The three thermostat heating inputs connect to the P2 terminal block on the Simplicity control board to terminals W1, W2, and W3. The four thermostat cooling inputs connect to the P2 and P3 terminal block on the Simplicity control board to terminals Y1, Y2, Y3, and Y4.

The thermostat should be mounted on an inside wall approximately 56” above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances.

Note that 24 VAC terminal (R) on terminal block P1 of the Simplicity control board must be used as the 24 VAC source for the input to the thermostat. Use of any power source external to the controller will result in damage to the Unit Controller.

Fan input

By closing a contact between terminal (R) and (G) on terminal block P1 on the Simplicity control board the supply fan can be turned on. This function is typically used on CV units and is included with most room thermostats.

Note that 24 VAC terminal (R) on terminal block P1 of the Simplicity control board must be used as the 24 VAC source for the input to (G). Use of any power source external to the controller will result in damage to the Unit Controller.

Space Sensor

A space sensor can be used in lieu of a thermostat as the primary means of control on a CV unit. The space sensor is connected to terminals (ST) and (GND) of terminal block P8 on the Simplicity control board.

A space sensor with a 20,000 potentiometer can be used to reset the space temperature set point. The space temperature reset is connected to terminals (SSO) and (GND) of terminal P8 on the Simplicity control board.

When mounting a space sensor, it should be located on an inside wall approximately 56” above the floor where it will not be subject to drafts, sun exposure, or heat from electrical fixtures or appliances.

Shielded wire must be used that is grounded at the control panel only.

CO2 Sensor

The addition of a field installed CO2 sensor is required for Demand Ventilation operation. The default input span for the control is 0 to 2,000 ppm with an output voltage range of 0 to 10 VDC. The field will need to supply an external power supply for the sensor. This is in addition to the two wires connect to the unit. The sensor connects to terminals (DV+) and (DV-) of terminal block P20 on the Simplicity control board. The wiring to the sensor should be a twisted shield pair grounded on one end.

Occupied / Unoccupied Input

A contact closure input to terminal (OCC) of the P1 terminal block on the Simplicity control board is provided for hard-wiring an external device such as a central time clock, a thermostat with scheduling, or a manual switch to switch the unit from Unoccupied to Occupied mode.

Closed Circuit – Occupied
Open Circuit – Unoccupied

Note that 24 VAC terminal (R) on terminal block P1 of the Simplicity control board must be used as the 24 VAC source for the input to (OCC). Use of any power source external to the controller will result in damage to the Unit Controller.

Shutdown Input

A jumper is installed between terminal "R" and "SD1" on the Simplicity control board. To install a hard-wired shutdown circuit, remove the jumper between the two terminals and connect a switch between the terminals. The switch must be closed for operation and open for shutdown. Opening the switch removes the 24 VAC power to the Unit Controller.

Closed Circuit – Normal Operation
Open Circuit – Shutdown

Note that 24 VAC terminal (R) on terminal block P1 of the Simplicity control board must be used as the 24 VAC source for the input to (SD). Use of any power source external to the controller will result in damage to the Unit Controller.

Smoke Purge Input

A contact closure input (PURGE) is provided to place the unit in smoke purge mode. When the contact is closed the unit will operate as follows:

- Turn off all heating and cooling operation
- Set the outdoor air damper output to 100%
- Close the return to 0%
- Turn the supply fan on
- On VAV units set the supply fan output to 100%
- Turn the power exhaust fan on
- On VFD driven exhaust fans set the exhaust fan output to 100%

Note that 24 volts terminal (R) on the Simplicity control board must be used as the 24 Volt AC source for switch the contact to the Unit Controller Smoke Purge (PURGE) input. Use of any power source external to the controller will result in damage to the Unit Controller.

BAS Economizer Input

The Simplicity control board has the capability to control the economizer damper through a 2 – 10 Volt DC input. *Refer to BAS Economizer Input information contained in Section 5 of the manual for additional information on the programming and operation of this feature.*

The 2 to 10 VDC input connects to terminals (BAS ECON +) and (BAS ECON –) at terminal block P3 of the Simplicity control board

Fault Output

The Simplicity control board has the capability out sending a positive half wave 24 VAC output whenever an alarm is present. It is capable of driving a 25 ma load. This is design to connect to a fault light on a commercial thermostat. This output originates at terminal (X) at terminal block P1 on the Simplicity control board.

VAV Heat Relay Output

This is a 24 VDC output that is turned on when the unit is in the heating mode. The field can use this as a signal to trigger the opening of the VAV boxes for heating operation. This feature uses two ¼ inch male tabs identified as (VAV OPEN +) and (VAV OPEN -) on the Simplicity control board.

Supply Air Temperature Reset

An external 0 to 10 VDC input can be applied to terminals (REM+) and (REM-) at terminal block P19 on the Simplicity control board to reset the supply air temperature set point for VAV operation. The units follows interprets the voltage input as follows:

Below 1.0 VDC – the blower is de-energized

Below 1.5 VDC – the cooling and heating is disabled

At 2.0 VDC – the control uses the lower set point

Between 2.0 VDC and 10 VDC the change in set point is proportional to the change in voltage.

At 10.0 VDC – the control uses the upper set point

COMMUNICATION

The Simplicity Unit Controller is designed to communicate using Modbus Client protocol. Through the use of a ModLINC translator the unit can also communicate using BACnet MS/TP protocol.

Through the use of a FREEnet Serial or USB adapter the Simplicity Unit Controller can be connected directly to a computer. Multiple units can be daisy chained together and through the use of the adapter connected to a computer or a network. This allows remote monitoring of the unit as well as the ability to change settings and options from a remote location.

Connection to the unit is done through either of two RS-485 connections. The P4 terminal block has screw connections with terminal A being the – and terminal B being the +. The P5 connecter is designed to allow the mating connector from the FREEnet Serial or USB adapter to be plugged in.

See Table 6-1 for parameter points list.

DIRTY FILTER SWITCH

On units with a dirty filter switch option, an adjustable differential pressure switch is installed to monitor the pressure drop across the filters. When the pressure drop across the filters exceeds the setting of the switch, the switch closes sending a 24-volt signal to the Unit Controller. The Unit Controller posts a warning in the service memory buffer; but will not shut down the unit.

FIELD CONTROL WIRING CONNECTIONS

Wiring Notes:

1. Wiring shown indicates typical wiring. *Refer to the IOM manual for more detailed wiring methods and options.*
2. All wiring is Class 2, low voltage.
3. Maximum power available from the 24 VAVC terminal is 40 VA.
4. Use shielded wire where shown.

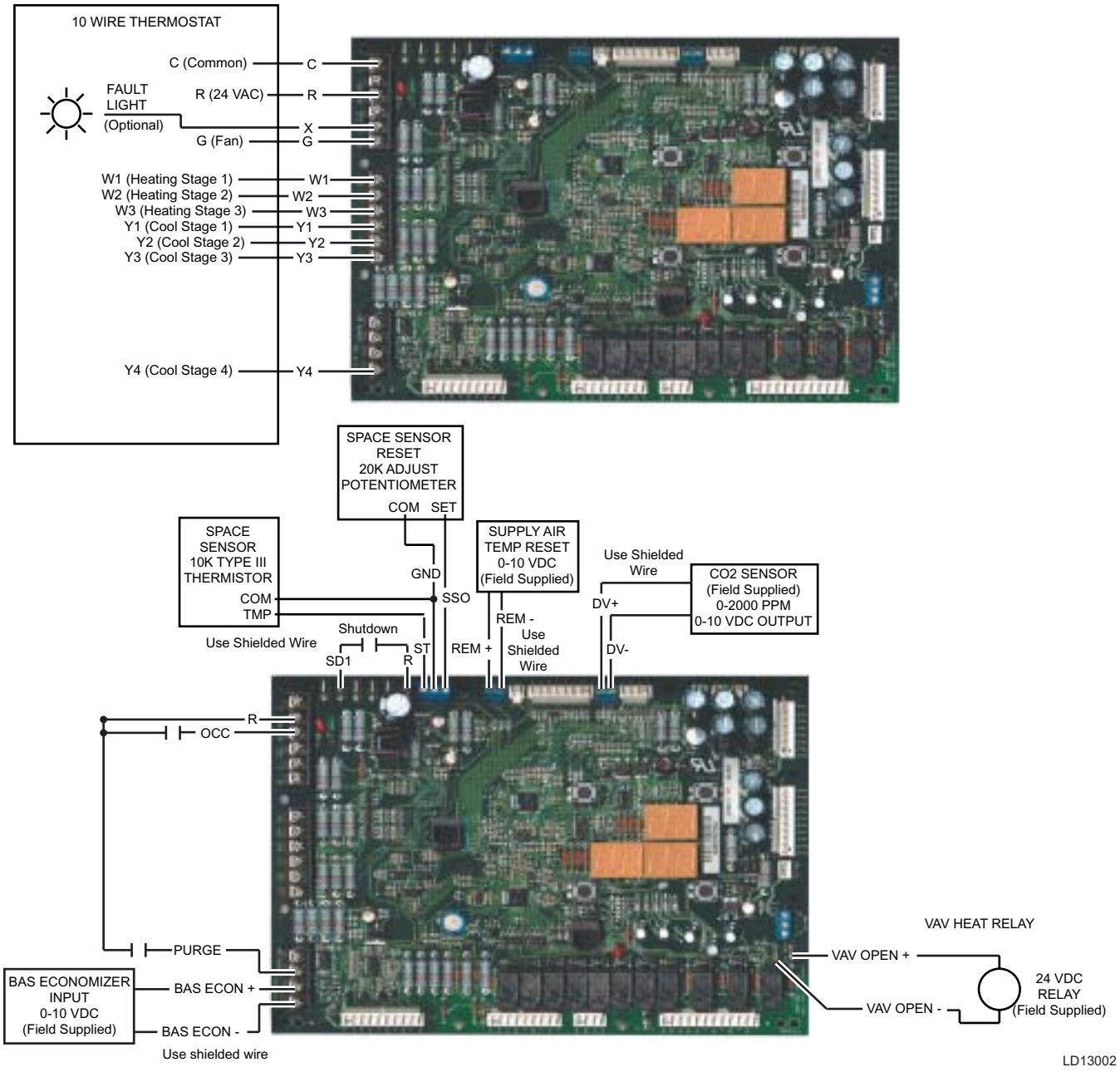


FIG. 2-8 – FIELD CONTROL WIRING CONNECTIONS

POWER WIRING

POWER WIRING

Field wiring to the unit must conform to provisions of National Electrical Code (NEC) ANSI / NFPA 70- Latest Edition and / or local ordinances. The unit must be electrically grounded in accordance with the NEC and / or local codes. Voltage tolerances, which must be maintained during starting and running conditions, are indicated on the unit data plate.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

Power supply to the unit must be NEC Class 1 and must comply with all applicable codes. A disconnect switch must be provided (factory option available). The switch must be separate from all other circuits. Wire entry at knockout openings requires conduit fittings to comply with NEC and/or Local Codes.

Refer to Figures 2-9, 2-10 & 2-11 for typical field wiring and to the appropriate unit wiring diagram mounted inside control doors for control circuit and power wiring information.

ELECTRICAL SERVICE SIZING

Electrical service required for the cooling only eco^2 rooftop, use the appropriate calculations listed below from U.L. 1995. Based on the operating mode and configuration of the rooftop, the calculations will yield different MCA (minimum circuit ampacity), and MOP (maximum overcurrent protection). **MCA and Overcurrent Protection Device Data is supplied on the unit data plate. A***lso refer to Table 2-7, 2-9, 2-10, 2-11, 2-12, 2-13 and 2-14, Electrical Data.*

The following calculations apply to electrical data for the rooftop unit. All concurrent load conditions must be considered in the calculations, and you must use the highest value for any combination of loads.

Minimum Circuit Ampacity (MCA) is based on 125% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-34.

The minimum recommended disconnect switch is based on 115% of the rated load amps for all loads included in the circuit, per N.E.C.

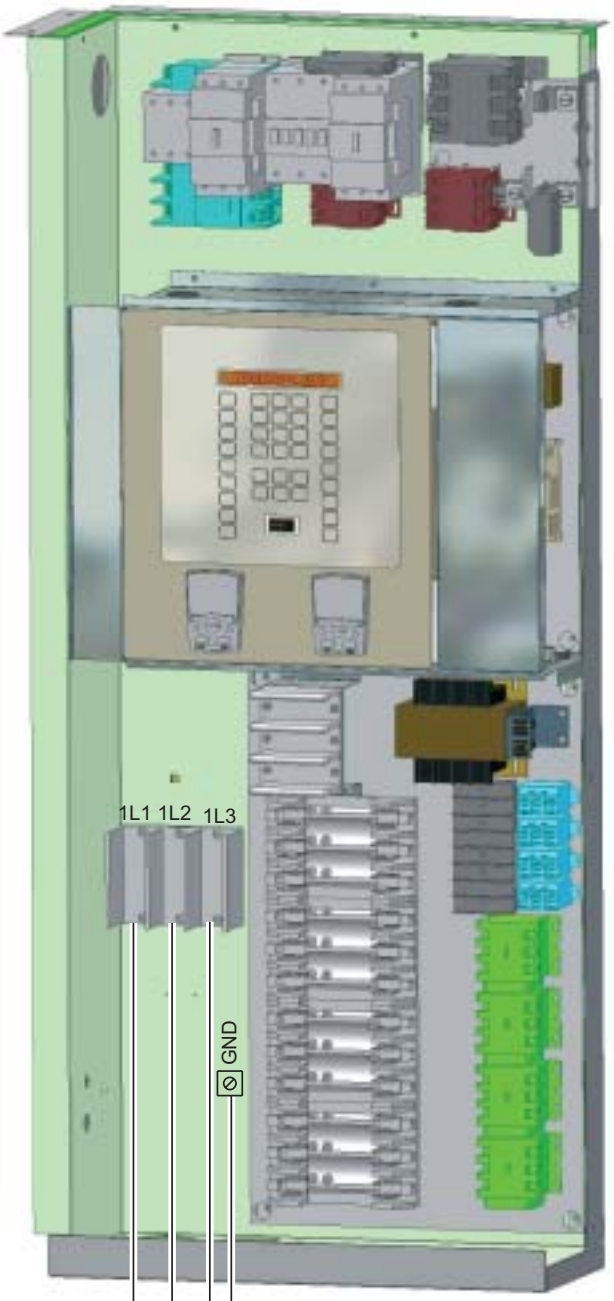
Maximum overcurrent protection is based upon 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-22. If the maximum overcurrent protection does not equal a standard current rating of an overcurrent protective device, then the marked maximum rating is to be the next lower standard rating. However, if the device selected for maximum overcurrent protection is less than the MCA, then select the lowest standard maximum fuse size greater than or equal to the MCA.

Figures 2-9, 2-10 & 2-11 show the power wiring that must be field supplied and installed. *See Table 2-16 for the allowable conductor wire size for the electrical lugs in the unit.*

For dual point power connections, TB1 in the power panel supplies the all unit compressors and condenser fans. TB2 in the power panel supplies power to the unit supply, return and exhaust fans, and control circuitry.

All wiring must conform to the National Electrical Code (NEC) and local codes that may be in addition to NEC.

SINGLE-POINT POWER SUPPLY WIRING

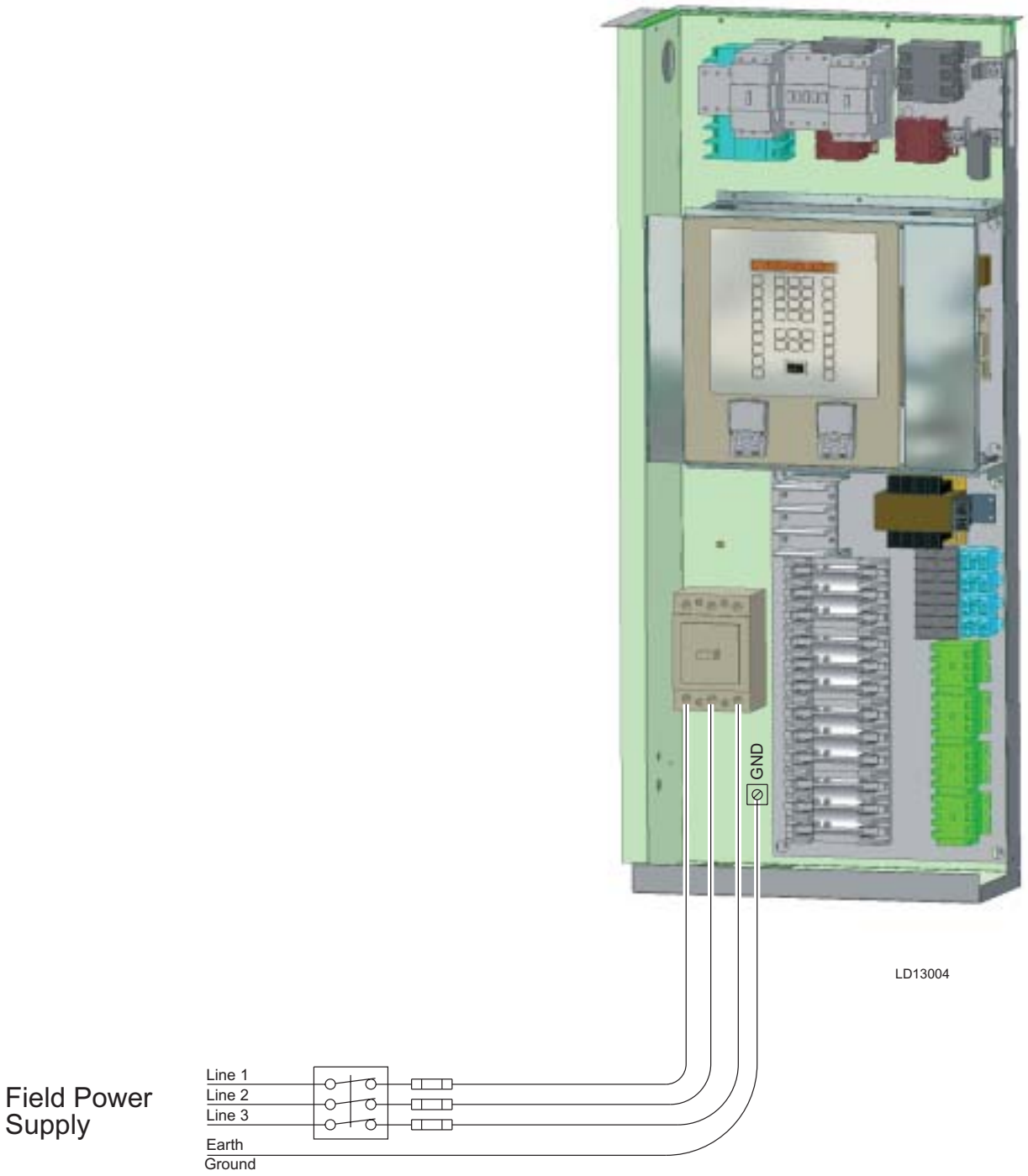


NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Minimum Circuit Ampacity (MCA) is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440-34).
4. Maximum Dual Element Fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440-22).
5. Use copper conductors only.

FIG. 2-9 – SINGLE-POINT POWER SUPPLY WIRING

SINGLE-POINT POWER SUPPLY WIRING WITH NON-FUSED DISCONNECT SWITCH

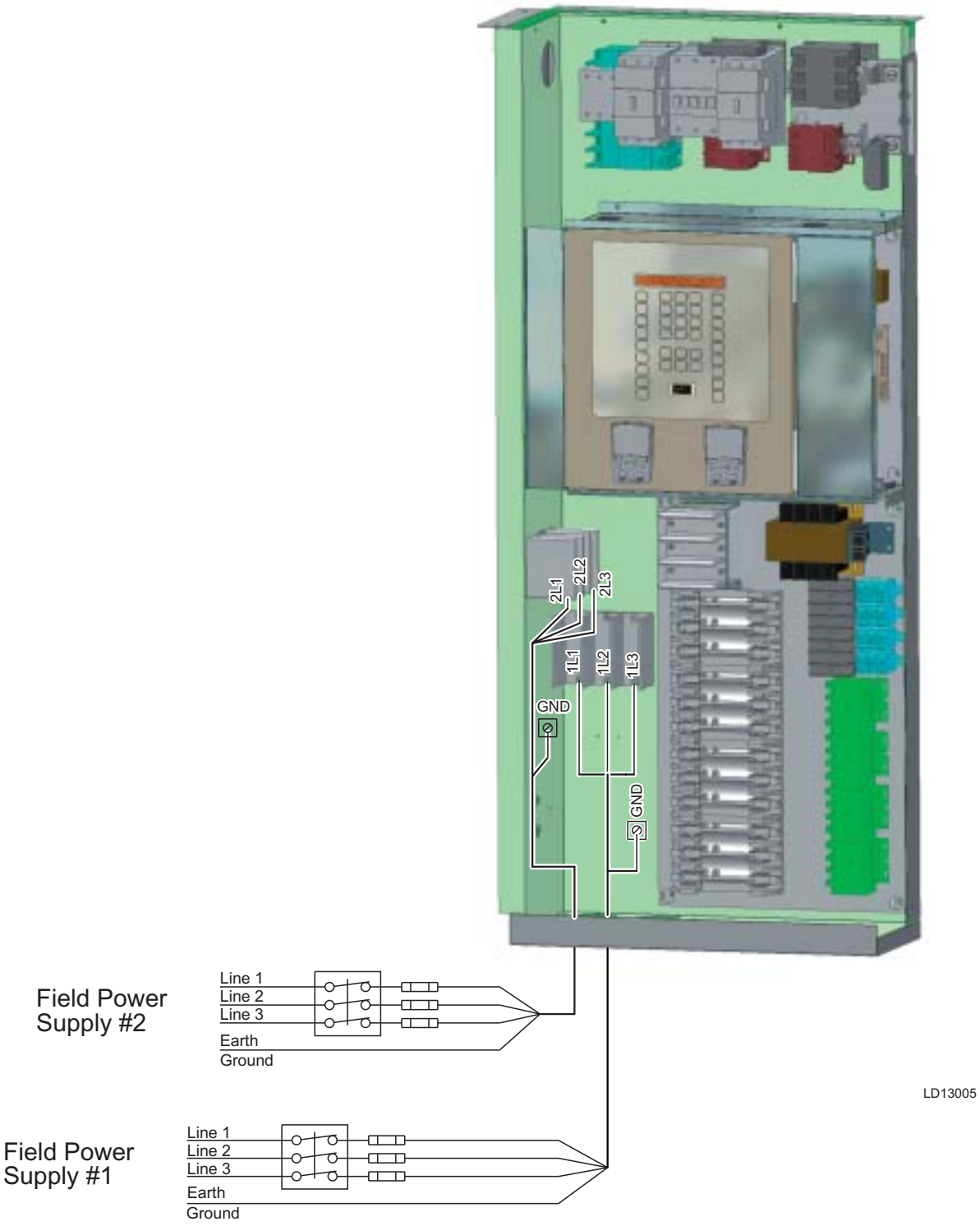


NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Minimum Circuit Ampacity (MCA) is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440-34).
4. Maximum Dual Element Fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440-22).
5. Use copper conductors only.
6. On units with an optional disconnect switch, the supplied disconnect switch is a “Disconnecting Means” as defined in the N.E.C. Section 100, and is intended for isolating the unit from the available power supply to perform maintenance and troubleshooting. This disconnect switch is not intended to be a Load Break Device.

FIG. 2-10 – SINGLE-POINT POWER SUPPLY WIRING WITH NON-FUSED DISCONNECT

DUAL-POINT POWER SUPPLY WIRING



NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Minimum Circuit Ampacity (MCA) is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440.34).
4. Maximum Dual Element Fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440.22).
5. Use copper conductors only.

FIG. 2-11 – DUAL-POINT POWER SUPPLY WIRING

CONTROLS

TABLE 2-16 – THREE PHASE POWER SUPPLY CONDUCTOR SIZE RANGE

050-061 Models

Supply Voltage	Single Point TB	Single Point Disconnect	Dual Point TB TB 1	TB 2
208V	(2*) 250 kcmil-500 kcmil	(2*) 2 AWG-500 kcmil	6 AWG-400 kcmil	6 AWG-350 kcmil
230V	(2*) 250 kcmil-500 kcmil	(2*) 2 AWG-500 kcmil	6 AWG-400 kcmil	6 AWG-350 kcmil
380V-60	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0
460V	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0
575V	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0

TRANSDUCER PNEUMATIC TUBING

Static Pressure Control Plastic Tubing (Pneumatic Tubing)

Duct static transducers (all VAV units) and any unit with an optional building pressure control transducer, require pneumatic tubing to be field supplied and installed. Both the duct static transducer (VAV only) and optional building pressure transducer are mounted behind the right hand damper door. All wiring from the transducers is factory installed.

Duct Static Transducer

Plastic tubing (3/16" ID) must be run from the high pressure tap of the transducer to a static pressure tap (field supplied) in the supply duct, located at a point where constant pressure is desired. This is normally 2/3rds of the way down the duct, before the first take off.

Building Pressure Transducer

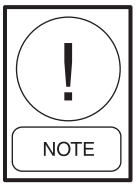
Plastic tubing (3/16” ID) must be run from the high pressure tap of the building static pressure transducer to a static pressure tap (field supplied), located in the conditioned space. The tap should be placed in a location where over pressurization will cause a problem, for example, in the lobby area where excessive pressure will cause the doors to remain open. The tap should never be placed above the ceiling.

Static Pressure Probe Installation

On units with duct static transducers (VAV units) and any unit with an optional building pressure, a factory supplied Static Pressure Probe must be field installed at the top of the rear corner post on the unit - *see Figure. 2-12.*

The factory supplied atmospheric pressure probe and associated mounting hardware are shipped inside the unit control panel. The hardware consists of a mounting bracket and a short section of pneumatic tubing. ***The pneumatic tubing must be field installed from a factory pressure tap (next to the mounting location for the static pressure probe) to the atmospheric pressure probe (see Installation Instructions, Form XXX.XX-XX).***

If the unit is equipped with both a building pressure transducer and a duct static transducer, a “tee” will be factory installed, and both the Duct Static Pressure Transducer and building pressure will be connected to the “tee” - both building static pressure transducer and duct static transducer will use the same factory supplied atmospheric pressure probe.



The “low” side connection of the duct static or building pressure transducers are shipped with the pneumatic tubing factory installed and routed, to the external factory pressure tap.

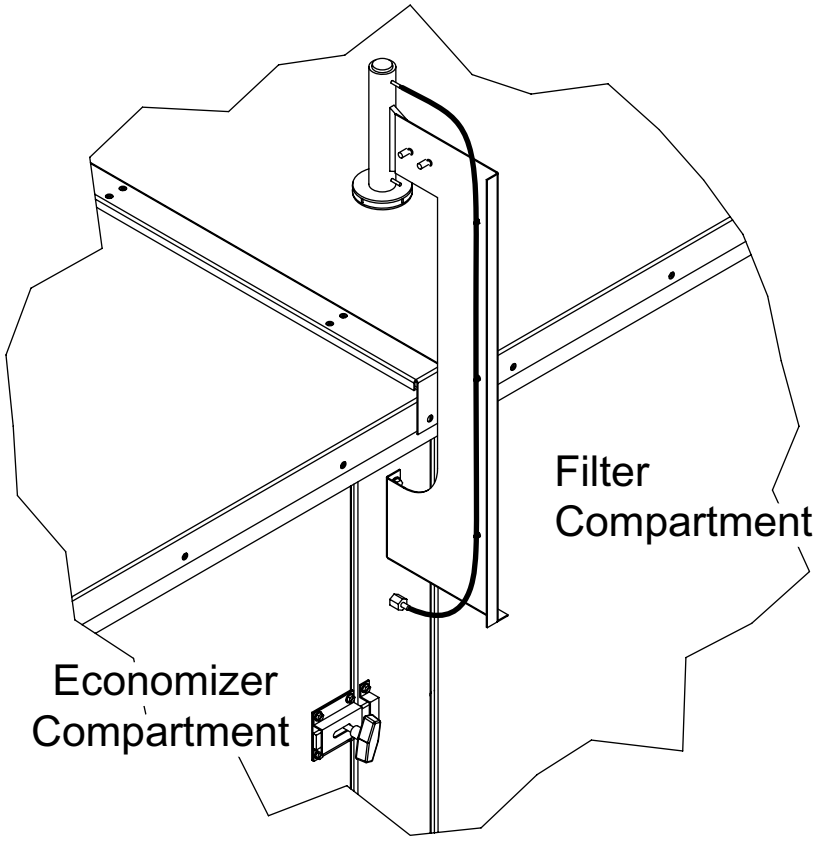


FIG. 2-12 – ATMOSPHERIC SENSOR PROBE

The atmospheric probe should be mounted on the support post on the control side of the unit between the Economizer and the Filter compartment.

DUCT SYSTEM

Duct Connection Guidelines

All intake and discharge air duct connection to the unit may be made directly to the unit. These air duct connections should be on flexible material and should be installed so they are sufficiently loose. Duct runs and transitions must be made carefully to hold friction loss to a minimum. Avoid short turns, and duct elbows should contain splitters or turning vanes.

Duct work connected to the fan discharge should run in a straight line for at least **two** equivalent outlet diameters. Never deadhead the discharge into the flat surface of a plenum.

Refer to Table 2-17 and 2-18 for available supply and return duct connection configuration.

TABLE 2-17 – SUPPLY AIR DUCT CONNECTION CONFIGURATIONS

UNIT CONFIGURATION		SUPPLY AIR		
		BOTTOM	LEFT	RIGHT
50-61 TONS	COOLING ONLY	√	√	√
	COOL/GAS HEAT 375-750 MBH	√	√	N/A
	COOL/GAS HEAT 1125 MBH	√	N/A	N/A

TABLE 2-18 – RETURN AIR DUCT CONNECTION CONFIGURATIONS

UNIT CONFIGURATION		SUPPLY AIR		
		BOTTOM	LEFT	RIGHT
50-61 TONS	NO EXHAUST	√	√	√
	BAROMETRIC RELIEF DAMPER	√	√	N/A
	POWERED EXHAUST FAN	√	√	N/A
	RETURN FAN	√	N/A	N/A

CAUTION

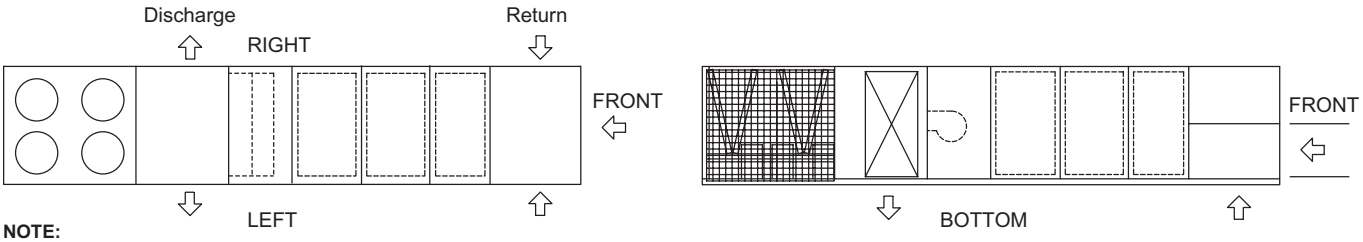
Installation of elbows, discharge damper and other abrupt flow area changes installed directly at the fan outlet will cause system losses. These losses must be taken into account during the design phase and must be added to any field measurements.

SOUND AND VIBRATION TRANSMISSION

All roof mounted air handling units generate some sound and vibration, which may or may not require some special treatment of the air conditioned space. The noise generated by the air handling unit is dependent on the speed of the fan, the amount of air the fan is moving, the fan type and the static efficiency of the fan. In applications where sound and vibration transmissions may be objectionable, good acoustical engineering practices must be incorporated in the system design.

The eco^2 unit is designed for lower sound levels than competitive units by using flexible fan connections, fan spring isolators, double-wall construction, multiple fan options, and lower speed and horsepower fans. For VAV applications, VFDs are used instead of inlet guide vanes. Additional sound attenuation can be obtained using compressor sound blankets and field-supplied sound attenuators when necessary.

Even with these equipment design features, the acoustical characteristics of the entire installation must never be overlooked. Additional steps for the acoustical characteristics of a rooftop installation should be addressed during the design phase of a project to avoid costly alterations after the installation of the equipment. During the design phase of a project, the designing engineer should consider, at a minimum, the impact of the equipment location, rooftop installation, building structure, and duct work.



NOTE:

This diagram is provided as a visual reference of the eco^2 discharge & return air openings & locations for all sizes. *Please refer to Fig 2-4 for exact size & location of panels and openings.*

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GAS HEATING

GAS PIPING

Proper sizing of the gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and the length of run. National Fuel Gas Code Z223.1 – latest Edition should be followed in all cases unless superseded by local codes or gas company requirements. *Refer to Table 2-19.*

The heating value of the gas may differ with locality. The value should be checked with the local gas utility.

TABLE 2-19 – PIPE SIZES

LENGTH IN FEET	NOMINAL IRON PIPE SIZE	
	1-1/2 IN.[1]	2 IN.[1]
10	1,600	3,050
20	1,100	2,100
30	890	1,650
40	760	1,450
50		1,270
60		1,150
70		1,050
80		990

[1] Maximum capacity of pipe in cubic feet of gas per hour (based upon a pressure drop of 0.3 inch water column and 0.6 specific gravity gas).

NOTE

There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 1-1/2-inch pipe connection at the entrance fitting. Line size should not be sized smaller then the entrance fitting size.

GAS CONNECTION

The gas supply line should be routed within the space and penetrate the roof at the gas inlet connection of the unit. The gas piping can enter the unit through an opening in the base of the gas heat section. Many local codes require that a shut off valve be located external to the unit. In these cases it is easier to run the gas piping on the roof and enter the unit through the side of the base rail. Typical supply piping arrangements are shown in Figure 2-13.

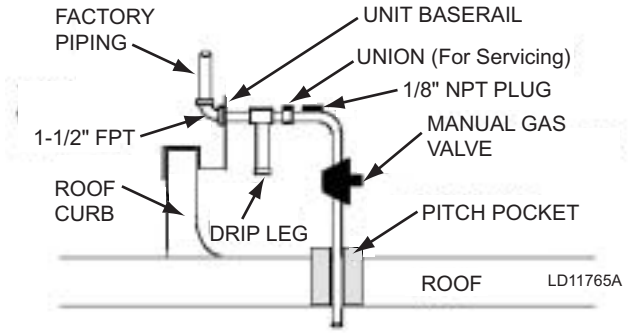

FIG. 2-13 – TYPICAL GAS PIPING CONNECTION

Gas Piping Recommendations

1. A drip leg and a ground joint union must be installed in the gas piping.
2. When required by local codes, a manual shut-off valve will have to be installed outside of the unit.
3. Use wrought iron or steel pipe for all gas lines. Pipe dope should be applied sparingly to male threads only.

WARNING

Natural gas may contain some propane. Propane being an excellent solvent will quickly dissolve white lead or most standard commercial compounds. Therefore, a special pipe dope must be applied when wrought iron or steel pipe is used. Shellac base components such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clyde's or John Crane may be used.

4. All piping should be cleaned of dirt and scale by hammering on the outside of the pipe and blowing out the loose particles. Before initial start-up, be sure that all of the gas lines external to the unit have been purged of air.
5. The gas supply should be a separate line and installed in accordance with all safety codes as prescribed under "Limitations" listed in the beginning of this section. After the gas connections have been completed, open the main shutoff valve admitting gas pressure to the mains. Check all joints for leaks with soap solution or other material suitable for the purpose. **NEVER USE A FLAME!**

6. The furnace and its individual manual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 0.5 PSIG.

WARNING

Disconnect gas piping from unit when leak testing at pressures greater than 0.5 PSIG. Pressures greater than 0.5 PSIG will cause gas valve damage resulting in a hazardous condition. If gas valve is subjected to pressure greater than 0.5 PSIG, it must be replaced.

7. A 1/8 inch N.P.T plugged tapping, accessible for test gage connection, must be installed immediately upstream of the gas supply connection to the furnace.

COMBUSTION VENT

The combustion vent assembly is shipped in the return air section of the unit. The combustion vent assembly must be mounted over the flue gas outlet fixed panel located to the right of the gas heat access door. Install as follows:

1. Remove the combustion vent assembly from the return compartment.
2. Remove the vertical row of six screws on either side of the flue gas outlet fixed panel.
3. Mount the combustion vent assembly over the flue gas outlets and attach to the gas outlet fixed panel using the screws removed in step 2.
4. *See Figure 2-14 for the proper orientation of the combustion vent.* The internal baffle(s) must direct the flue gases upward.

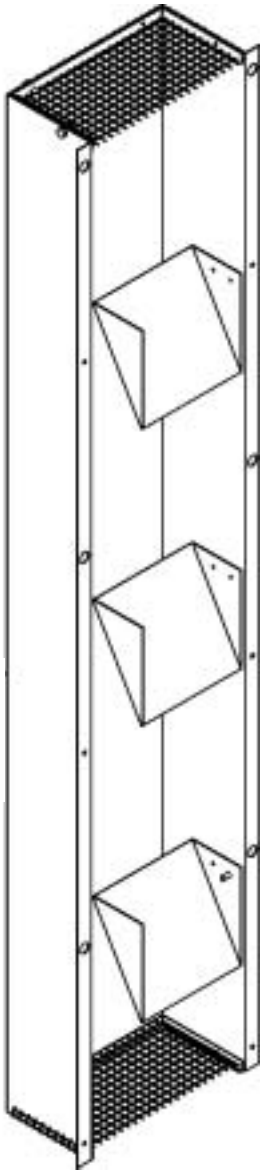

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FIG. 2-14 – COMBUSTION VENT

SECTION 3 – START-UP

To protect warranty, this equipment must be installed and serviced by an authorized JOHNSON CONTROLS service mechanic or a qualified service person experienced in air handling and condenser unit installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as relief valves, HP cut-out settings, design working pressures and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the Control Panel. Before servicing, open and tag all disconnect switches.

Reference publication Form 100.50-SU1 (507) "Quick Startup Guide" for additional information.

CRANKCASE HEATERS

With power applied to the rooftop unit, the crankcase heater for each compressor will be ON whenever the compressor is not running. The heater is interlocked into the compressor motor contactor and is not controlled by the microprocessor.

The purpose of the crankcase heater is to prevent the migration of refrigerant to the crankcase during shutdown, assuring proper lubrication of the compressor on start-up.

Anytime power is removed from the unit for more than an hour, the crankcase heater should be left on for 24 hours prior to start.

Power must be applied to the rooftop unit 24 hours prior to starting the unit compressors. Failure to observe this requirement can lead to compressor damage and voiding of the compressor warranty.

CHECKING THE SYSTEM PRIOR TO INITIAL START (NO POWER)

Unit Checks

1. Inspect the unit for shipping or installation damage.
2. Visually check for refrigerant piping leaks.
3. The compressor oil level should be maintained so that an oil level is visible in the sight glass. The oil level can only be tested when the compressor is running in stabilized conditions, guaranteeing that there is no liquid refrigerant in the lower shell of the compressor. In this case, the oil must be between 1/4 and 3/4 in the sight glass. At shutdown, the oil level can fall to the bottom limit of the oil sight glass.
4. Check the control panel to assure it is free of foreign material (wires, metal chips, etc.).
5. Visually inspect field wiring (power and control). Wiring MUST meet N.E.C. and local codes.
6. Check tightness of terminal lugs inside the power panel on both sides of the contactors, overloads, fuses, and power connections.
7. Verify fuse sizing in main circuits.
8. Verify field wiring for thermostat (if applicable), optional zone sensor, etc.
9. Verify all applicable pneumatic tubing has been field installed for Duct Static Pressure Transducers (VAV units), optional building pressure transducer for power exhaust option, and outdoor static pressure prove.
10. Supply exhaust and return fan isolators spring bolts are removed *(refer to Figure 3-1).*
11. ***Verify proper bearing and locking collar torque values on supply and exhaust fans (refer to Maintenance section of manual).***
12. Verify proper drive alignment of supply and exhaust fans *(refer to Maintenance section of manual).*

CAUTION

The supply, exhaust and return fans have tie down bolts are installed at the factory to prevent movement in the fan assemblies during shipment. THESE HOLD DOWN BOLTS MUST BE REMOVED PRIOR TO OPERATION OF THE ABOVE FANS. There are eight bolts per assembly two at each comer of the fan skids, front and rear. The bolt locations are shown in Figure 3-1. The bolt heads are red in color and a label identifies their location in the unit.

13. Verify proper belt tension of supply fan, exhaust fan or return fan *(refer to Maintenance section of manual)*. Belts must be checked after 24 hours of initial operation.
14. Manually rotate condenser fan blades, supply exhaust and return blower wheels and motors, to assure freedom of movement.
15. Verify proper condensate drain trap installation *(refer to Figure 2-6)*. Fill traps with water prior to unit start-up.
16. If applicable, verify installation of air filters *(refer to Installation section for size and quantity)*.

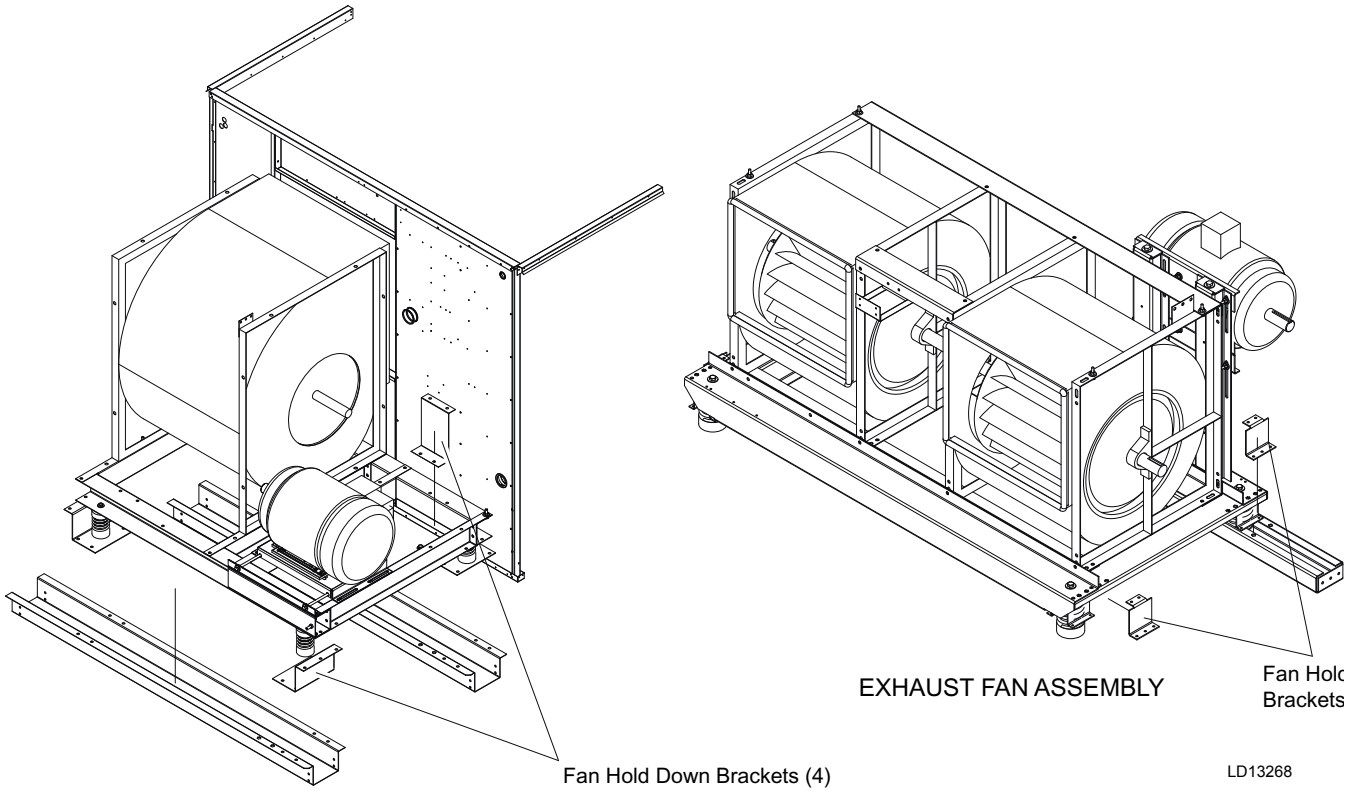


FIG. 3-1 – FAN HOLD DOWN BRACKETS

17. Verify Variable Frequency Drive setpoints for VAV unit Supply Fan and optional Variable Frequency Drive Exhaust and/or Return Fan drives. The Supply Fan VFD is located to the right of the electrical control box in the supply fan blower compartment. *Refer to separate manual for VFD operation supplied with the unit.*
18. If equipped, open suction line ball valve, discharge line ball valve, and liquid line ball valve for each refrigerant system.

UNIT CHECKS – POWER APPLIED

1. Apply 3-phase power and verify its value. Voltage imbalance should be no more than 2% of the average voltage.
2. Verify programmed units Setpoints *(refer to "Quick Start-Up Guide", Form 100.50-SU3).*
3. Verify correct fan rotation – fan should rotate in direction of arrow on fan housing.
4. Insure proper compressor rotation - *see following instruction on* ***Verifying Compressor Rotation.***

Verifying Compressor Rotation

This unit uses scroll compressors, which will only operate in one direction. Failure to observe these steps could lead to compressor failure.

The eco^2 rooftop unit uses hermetic scroll compressors, which only pump in one direction. Therefore, it is necessary to verify proper rotation at unit start-up. Operation of the compressor in the reverse direction will not pump, and cause the compressor to cycle on internal overload. Operating the compressor in reverse for "extended" periods can result in failure of the compressor.

To verify proper rotation, monitor the suction and discharge pressures of the respective refrigerant circuit when the compressor cycles on. If the discharge pressure increases and suction pressure decreases as the compressor cycles on, the compressor is properly phased and operating in the correct rotation.

Compressor Oil Level Check

The oil level can only be tested when the compressor is running in stabilized conditions, to ensure that there is no liquid refrigerant in the lower shell of the compressor. When the compressor is running in stabilized conditions, the oil level must be between 1/2 and 3/4 in the oil sight glass. *Note: at shutdown, the oil level can fall to the bottom limit of the oil sight glass.*

INITIAL START-UP

After all of the preceding checks have been completed and the control panel has been programmed as required, the unit may be placed into operation.

1. Place the Unit Switch in the control panel to the ON position.
2. With a demand, the supply fan will cycle on, and permit compressor operation if the air proving pressure switch for the supply fan has closed.
3. The first compressor will start. After several minutes of operation, a flow of refrigerant will be noted in the sight glass, the vapor in the sight glass will clear, and there should be a solid column of liquid visible in the sightglass when the TXV stabilizes.
4. Allow the compressor to run a short time, being ready to stop it immediately if any unusual noise or adverse conditions develop.
5. Check the system operating parameters by checking evaporator superheat and condensing subcooling. Connect a gauge manifold set to the Schrader service valve connections on the liquid and common suction line in the condensing section of the unit. After the system is running and the pressures have stabilized, measure the temperature at the liquid and common suction lines near the Schrader service valves. Calculate evaporator superheat and condensing subcooling. The subcooling, should be approximately 15.0 ˚F and the superheat should be 12.0 ˚F. Repeat the above process for each of the refrigerant systems.
6. With an ammeter, verify that each phase of the condenser fans, compressors, supply fan, and exhaust fan are within the RLA/FLA as listed on the unit data plate.

Refrigerant Charge

This rooftop unit comes fully charged from the factory with refrigerant R-410A as standard.

CONDENSER COIL PRESSURE DROP			
YPAL050	YPAL051	YPAL060	YPAL061
33 PSIG	39 PSIG	24 PSIG	27 PSIG

Checking Superheat and Subcooling

An R-410A temperature and pressure chart lists the associated *saturation* temperature in one column, with the associated pressure in another column. As a result, only one temperature/pressure column is needed to show the relationship.

Subcooling (R-410A)

When the refrigerant charge is correct, there will be no vapor in the liquid sight glass with the system operating under full load conditions.

The subcooling temperature of each system can be calculated by recording the temperature of the liquid line at the outlet of the condenser and subtracting it from the saturation temperature listed in Table 3-1, for the corresponding discharge pressure. If the rooftop unit does not have an access port for liquid access, subtract the condenser coil pressure drop value from the table on this page from the discharge pressure to determine the equivalent saturation temperature.

Example:

On a YPAL 050 the discharge pressure is 388 PSIG and the
liquid temperature is 95 °F

Liquid Pressure = Discharge Pressure (388 PSIG)
- 33.0 PSIG

Saturation Temperature for 355 PSIG = 108°F
Minus the liquid line temp = 95°F
Liquid Line Subcooling of = 13°F

The subcooling should be 15°F at design conditions.

Superheat (R-410A)

The superheat should be checked only after steady state operation of the unit has been established, the discharge air temperature has been pulled down to within the control range, and the unit is running in a fully loaded condition.

The superheat is calculated as the difference between the actual temperature of the refrigerant gas in the suction line and the temperature corresponding to the Suction Pressure as shown in Table 3-1.

Example:

The suction pressure is 130 PSIG and the suction line temperature is 57 °F

Suction Line Temperature	= 57°F
Saturation Temperature for 130 PSIG	= 45°F
Evaporator Superheat	= 12°F

When adjusting the expansion valve, the adjusting screw should be turned not more than one turn at a time, allowing sufficient time (approximately 15 minutes) between adjustments for the system and the thermal expansion valve to respond and stabilize.

The superheat setting should be adjusted to 12°F at design conditions.

Leak Checking

Leak check compressors, fittings and piping to assure no leaks. Verify the evaporator distributor tubes do not have bare copper touching each other or are against a sheet metal edge. If you are leak checking a unit charged with R-410A make sure the leak test device is capable of sensing refrigerant R-410A.

If the unit is functioning satisfactorily during the initial operating period, no safeties trip and the unit controls are functioning properly, the rooftop unit is ready to be placed into operation.

TABLE 3-1 –R410-A PRESSURE / TEMPERATURE CHART

PSIG	TEMP °F	PSIG	TEMP °F
0	-60	78	20
2	-58	80	21
4	-54	85	24
6	-50	90	26
8	-46	95	29
10	-42	100	32
12	-39	105	34
14	-36	110	36
16	-33	115	39
18	-30	120	41
20	-28	125	43
22	-26	130	45
24	-24	135	47
26	-20	140	49
28	-18	145	51
30	-16	150	53
32	-14	160	57
34	-12	170	60
36	-10	180	64
38	-8	190	67
40	-6	200	70
42	-4	210	73
44	-3	220	76
46	-2	225	78
48	0	235	80
50	1	245	83
52	3	255	85
54	4	265	88
56	6	275	90
58	7	285	92
60	8	295	95
62	10	305	97
64	11	325	101
66	13	355	108
68	14	375	112
70	15	405	118
72	16	500	134
74	17	600	149
76	19	700	159

GAS HEAT MODELS

Pre-Start Checks:

- When starting up these units, it is imperative that ALL gas fittings within the unit (in addition to the field installed gas connections) are leak checked with a soap solution as part of the unit commissioning process. The heat section must be fired when checking the joints on the manifold side of the gas valve. If any leaks are detected, the leaks must be repaired immediately and all joints rechecked.

- Verify wiring inside the burner compartment to insure the wiring/terminals are tight and securely connected to the components, such as the ignition control, flame sensor, gas valve, rollout switches and igniter.

- The gas heat start up sequence begins with a 30 second prepurge. The next step in the sequence is the closure of the air proving switch. The heat section has a combustion air-proving switch. This switch must close before the ignition sequence can initiate. If the air-proving switch is closed after the 30 second prepurge the ignition control will energize the spark igniter and open the gas valve.

- The furnace ignition control uses flame rectification as verification of burner operation. The minimum allowable flame current for operation is 0.7 dc microamps.

- If the furnace ignition control does not prove flame in 7 seconds, it will turn off the spark signal and close the gas valve. It will wait 30 seconds and then initiate a second ignition sequence. If flame is not proven during the second 7 second trial for ignition the control will turn off the spark signal, close the gas valve, wait 30 seconds and initiate a third ignition sequence. If flame rectification is not proven on the third try, the ignition control will lock out.

- The heat section has two roll out switches mounted above the burners. The purpose of the roll out switch is to protect the gas heat section from flame roll out, flame burning outside the heat exchanger. A restriction in the heat exchanger or breach in the flue passages could result in a roll out situation. The roll out switch is a manual reset device.

- The unit has two high temperature limit switches. One located at the heat exchanger vestibule panel and the other located in the area of the heat exchanger return bend. These limits are automatic reset devices. If the limit opens the ignition control will de-energize the gas valve. On staged gas heat, as soon as the limit closes the ignition control will reinitiate the ignition sequence. If the limit opens on a modulating gas heat section the Unit Controller will lockout the heat section.

- The control circuit is tested in the factory to insure that all of these steps are followed, however, natural gas is not actually introduced to the system in the plant; nitrogen is used in its place.

Post Start Checks:

When a signal is received at the gas heat control module from the Unit Controller, verify:

- Combustion blower starts and runs for 30 seconds before the spark is initiated.
- Spark igniter sparks.
- Gas valve opens.
- Burners light from right to left, in a 2.5 second time frame; that each one lights in sequential order from right to left; and establishes stable flame immediately upon ignition.
- Check for gas leaks in the unit piping as well as the supply piping.
- Check for correct manifold gas pressures. *See "Manifold Gas Pressure Adjustment" in this Section.*

- Check the supply pressure. It must be within the limitations shown in Table 3-2. Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the standby gas pressure exceed 13.5" WC, nor the operating pressure drop below 4.5" WC for natural gas or 11.0" WC for propane. If the gas pressure is outside these limits, contact the installing mechanical contractor for corrective action.
- The flame is stable, with flame present only at the end of the burner, no burning is occurring inside the burner. There should be little yellow tipping of the flame.
- There may be some smoke thru the flue, due to tooling oil burning off of the heat exchanger tubing.

TABLE 3-2 – LOW FIRE / HIGH FIRE PRESSURES

TYPE OF GAS	LINE PRESSURE		MANIFOLD PRESSURE	
	MINIMUM	MAXIMUM	LOW FIRE +/- 0.3 "WC	HIGH FIRE +/- 0.3 "WC
NATURAL	4.5 "WC	13.5 "WC	1.2 "WC	3.5 "WC
PROPANE	11.0 "WC	13.5 "WC	4.2 "WC	10.0"WC

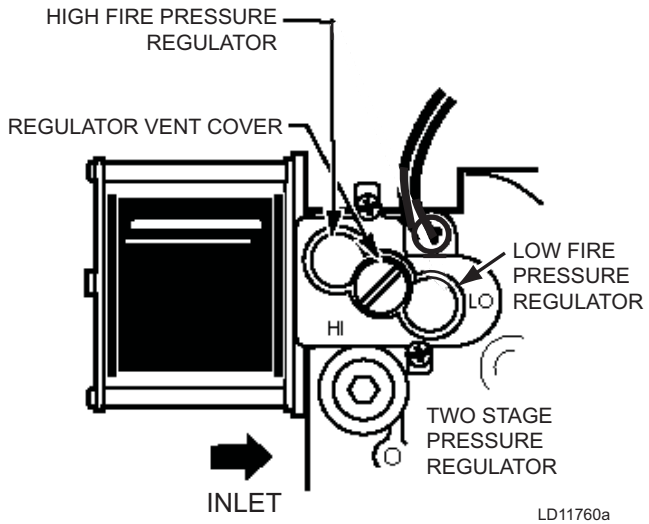


FIG. 3-2 – MANIFOLD GAS PRESSURE ADJUSTMENT

Manifold Gas Pressure Adjustment

- Small adjustments to the manifold gas pressure can be made by following the procedure outlined below. *Refer to Figure 3-2 for the high and low fire pressure regulator adjustment locations.*
- Turn the gas off to the unit.
- Use a 3/16 inch Allen wrench to remove the 1/8 inch NPT plug from the outlet pressure tap of the valve.
- Install a brass adapter to allow the connection of a hose to the outlet pressure tap of the valve.
- Connect the hose to a manometer capable of reading the required manifold pressure value.
- Turn the gas back on.
- Place the heat section into high fire operation.
- Compare the high fire manifold pressure to Table 3-2.
- To adjust the high fire manifold pressure remove the cap from the high fire pressure regulator. Use a 3/32 Allen wrench to make the manifold pressure adjustment. To increase the manifold pressure, turn the screw clockwise; to decrease the manifold pressure, turn the screw counterclockwise. Place your finger over the adjustment opening while verifying the manifold pressure.
- Place the heat section into low fire operation.
- Compare the low fire manifold pressure to Table 3-2.
- To adjust the low fire manifold pressure remove the cap from the low fire pressure regulator. Use a 3/32 inch Allen wrench to make the manifold pressure adjustment. To increase the manifold pressure, turn the screw clockwise; to decrease the manifold pressure, turn the screw counterclockwise. Place your finger over the adjustment opening while verifying the manifold pressure.
- Turn the heat off.
- Turn the gas off.
- Remove the brass tubing adapter and replace the plug in the outlet pressure tap.

TABLE 3-3 – GAS HEAT PERFORMANCE DATA

UNIT	GAS INPUT CAPACITY (BTU/HR X 1000)	MAXIMUM OUTPUT CAPACITY (BTU/HR X 1000)	AIRFLOW		TEMP. RISE (°F)
			MIN.	MAX.	
50-61	375	300	7,500	24,000	40
	750	600	14,000	24,000	40
	1125	900	21,000	24,000	40

SECTION 4 – MAINTENANCE

Make sure power is removed from the unit before performing the maintenance items contained in this section.

GENERAL

A planned program of regularly scheduled maintenance will return dividends by averting possible costly and unexpected periods of down time. It is the responsibility of the owner to provide the necessary maintenance for the air handling units and coils. If a system failure occurs due to improper maintenance during the warranty period, JOHNSON CONTROLS will not be liable for costs incurred to return the unit to satisfactory operation.

PERIODIC MAINTENANCE – MONTHLY

Filters

Check the cleanliness of the filters and replace or clean as required.

Linkages

Examine the damper and operator linkages to insure that each is free and operating smoothly.

Compressors

Oil Level Check: The oil level can only be tested when the compressor is running in stabilized conditions, to ensure that there is no liquid refrigerant in the lower shell of the compressor. When the compressor is running in stabilized conditions, the oil level must be between 1/4 and 3/4 in the oil sight glass. *Note: at shutdown, the oil level can fall to the bottom limit of the oil sight glass.*

Oil Analysis: Use York Type "T" POE oil (clear) for units charged with R-410A refrigerant. The type of refrigerant and amount per system is listed on the unit rating plate. A change in the oil color or odor may be an indication of contaminates in the refrigeration system. If this occurs, an oil sample should be taken and analyzed. If contaminations are present, the system must be cleaned to prevent compressor failure. This can be accomplished through the installation of oversized suction and liquid line driers. The driers may have to be changed several times to clean up the system depending on the degree of contamination.

Never use the scroll compressor to pump the refrigerant system down into a vacuum. Doing so will cause internal arcing of the compressor motor, which will result in failure of compressor.

Fan Bearing Lubrication

Add grease slowly with shaft rotating until a slight bead forms at the seals. If necessary, re-lubricate while bearing is stationary. The fan data plate (attached to the fan scroll) lists the type of grease that must be used for lubricating the bearings. *Refer to Table 4-1 for lubricating schedule.*

Re-lubrication is generally accompanied by a temporary rise in operating temperature. Excess grease will be purged at seals.

Recommended Lubricant for Fan Bearings

A Lithium / Petroleum base grease conforming to an NLGI Grade II consistency is normally used. Lubricant must be free of any chemical impurities such as free acid or free alkali, dust, rust, metal particles or abrasive. This light viscosity, low torque grease is rust inhibited and water resistant, has a temperature range of -30°F to +200°F with intermittent highs of +250°F. Lubricate bearings as required by the severity of required duty.

TABLE 4-1 – FAN BEARING – LUBRICATION INTERVALS

RELUBRICATION SCHEDULE (MONTHS) BALL BEARING PILLOW BLOCKS									
SPEED (RPM)	**500**	**1000**	**1500**	**2000**	**2500**	**3000**	**3500**	**4000**	**4500**
SHAFT DIA									
1/2" thru 1-11/16"	6	6	5	3	3	2	2	2	1
1-15/16" thru 2-7/16"	6	5	4	2	2	1	1/2	1/4	1/4
2-11/16" thru 2-15/16"	5	4	3	2	1	1/2	1/2		
3-7/16" thru 3-15/16"	4	3	2	1	1/2	1/2			

Condenser Coils

Dirt should not be allowed to accumulate on the condenser coil surfaces. Cleaning should be as often as necessary to keep coil clean.

PERIODIC MAINTENANCE – THREE TO SIX MONTHS

Disconnect and lock-out power from the unit anytime service is being performed on the fan section. Failure to do so could result in serious injury or death due to the fan turning on while work is in progress.

Squealing belts during starting is caused by slipping belts that are not tensioned properly.

Motor Bearing Lubrication

Bearings must be re-lubricated periodically to assure long life. Motor bearing should be lubricated yearly, but may need lubrication more frequently, depending on severe operating conditions.

Belt Tension

Adjust the belt tension if necessary. Required belt tension data is supplied on the fan "skid" data plate, attached to the fan housing. Never use a belt dressing on the belts. If belts slip with the proper tension, use a good grade of belt cleanser to clean the belts. *Refer to Figures 4-1.*

Never use excessive belt tension, as this could result in damaging the bearing, motor pulleys or motor base. See drive label on fan housing adjacent to drive for specific details on tension.

When it is necessary to replace one belt in a given set, the entire set of belts must be replaced.

PERIODIC MAINTENANCE – YEARLY

Check the fan wheels and inspect the drain pan for sludge and foreign material. Clean if required.

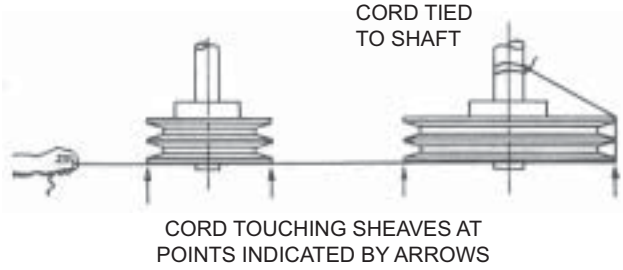
Observe the operation of all dampers and make any necessary adjustments in linkage and blade orientation for proper operation.

Entire Unit Inspection

In addition to the checks listed in this section, periodic overall inspections of the unit should be accomplished to ensure proper equipment operation. Items such as loose hardware, component operation, refrigerant leaks, unusual noises, etc. should be investigated and corrected immediately.

Sheave Alignment:

To check sheave alignment, a straight edge or a piece of string can be used. If the sheaves are properly aligned, the string or straight edge will touch at all points, as indicated in Figure. 4-1. Rotating the sheaves will determine if the sheave is wobbly or the drive shaft is bent. Alignment error must be corrected to avoid bearing and belt failure.



LD07634

FIG. 4-1 – SHEAVE ALIGNMENT

Belts

New belts should be re-checked after 24 hours of operation. On multiple belt adjustable pulleys, the pitch depth should be checked to insure identical belt travel, power transfer and wear. Adjustable motor bases are provided for belt adjustment.

Motor pulleys and blower shaft pulleys are locked in position with either set screws or split taper lock bushings. All set screws and/or taper lock bolts must be checked for tightness and alignment before putting equipment into operation.

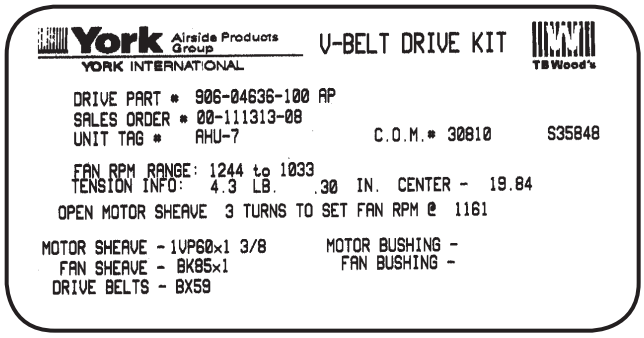
An incorrectly aligned and tensioned belt can substantially shorten belt life or overload blower and motor bearings, shortening their life expectancy. A belt tensioned too tightly can overload the motor electrical, causing nuisance tripping of the motor overloads and/or motor failure and/or shaft failure.

Belt Replacement

Always replace belts as a set. Follow the steps below to replace belts:

1. Release the tension on the belts by loosening the adjusting nuts on the fan motor.
2. Remove old belts and recheck the sheave alignment with a straight edge.
3. Install the new belts on the sheaves.

Never place the belts on the sheaves by using a screwdriver to pry the belt over the rim of the sheave. This will permanently damage the belts.


York Airside Products Group
YORK INTERNATIONAL
V-BELT DRIVE KIT
TB Wood's
DRIVE PART # 906-04636-100 AP
SALES ORDER # 00-111313-08
UNIT TAG # AHU-7
C.O.M.# 30810
S35848
FAN RPM RANGE: 1244 to 1033
TENSION INFO: 4.3 LB. .30 IN. CENTER - 19.84
OPEN MOTOR SHEAVE 3 TURNS TO SET FAN RPM @ 1161
MOTOR SHEAVE - 1VP60x1 3/8
FAN SHEAVE - BK85x1
DRIVE BELTS - BX59
MOTOR BUSHING -
FAN BUSHING -

00494vip

FIG. 4-2 – FAN DATA PLATE - BELT TENSION

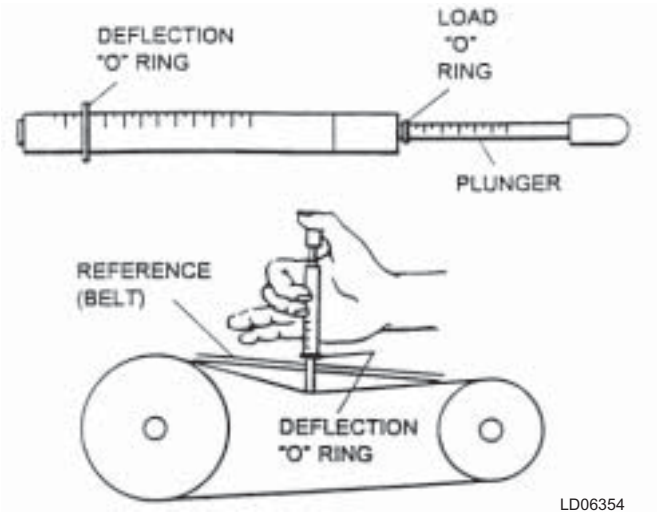


FIG. 4-3 – BELT TENSIONING GAUGE

Belt Tensioning:

Belt tension information is included on the fan skid data plate as shown in Figure. 4-2. Sample data plate shows 4.3 lbs pressure at .30 inches deflection.

A Browning Belt tension gauge is used in Figure. 4-3 to properly tension belts.

4

Filter Drier Replacement

The filter/drier should be replaced any time work is performed on the refrigerant circuit. The rooftop unit comes with sealed type (non-replaceable) cores as standard. If the unit is not equipped with the optional valve package (suction, discharge, & liquid line valves), the refrigerant will need to be recovered with a recovery machine to replace the filter/drier.

If the unit is equipped with a valve package, the unit can be pumped down by closing the liquid line ball valve (prior to the filter/drier) while the unit is running, initiating a unit pump-down. The unit will shut off when the mechanical low-pressure switch opens. When the unit shuts down, close the ball valve located after the filter/drier and remove power from the unit to prevent the unit from running. Once the filter/drier core has been replaced, the filter/drier section should be evacuated via the Schrader access valve located next to the filter/drier prior to opening the ball valves and restoring the unit to normal operation.

Never shut the discharge valve while the unit is running. Doing so could cause a rupture in the discharge line or components, resulting in death or serious injury.

Never close the suction line ball valve with the compressor running. Doing so will cause the compressor to pump-down into a vacuum and damage the compressor due to internal arcing.

Forward Curved Fans

The forward curved fan wheel must be removed through the fan discharge opening. The location of other clamps, fan wheel, and shaft must be marked so each of these components can be reassembled in the same location - *see Figure 4-4*. This will preserve the balance of the rotating assembly. Proceed with the following steps:

1. Disconnect all duct work or guards attached to the blower housing to permit unobstructed access.
2. Remove the cut off plate attached at the discharge or blast area of the blower housing.
3. Thoroughly clean the shaft of all grease and rust inhibitor. Be careful not to contaminate the bearing grease. Use emery cloth to remove all rust or the wheel may become “locked” to the shaft.

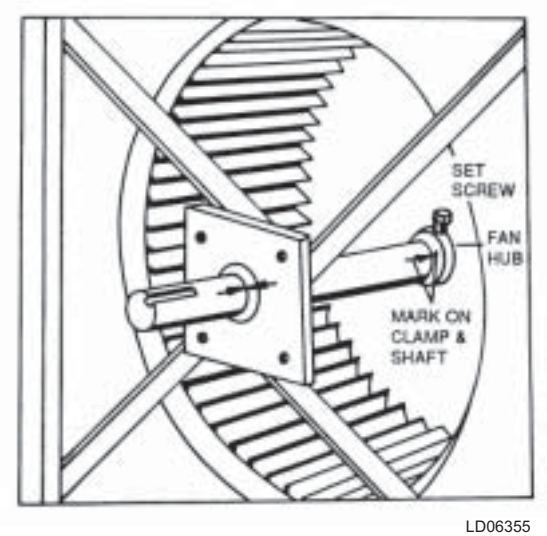


FIG. 4-4 – EXAMPLE OF FC FAN SHAFT/WHEEL MARKING

4. Loosen and remove set screws on both bearing locking collars. Inspect and, if necessary, replace.
5. Loosen and remove set screws from both sides of the wheel hub. Inspect and, if necessary, replace.
6. Using a rubber mallet or brass bar, slowly drive the shaft in one direction until the set screw marks on the shaft are fully exposed. File the marks completely smooth. Drive the shaft in the opposite direction and file smooth the set screw marks. Continue to clean the shaft of all dirt and residuals.
7. To remove the key, use a rubber mallet or brass bar to drive the shaft and wheel in one direction. Drive the key in the opposite direction using a nail set or smaller size key stock until the key is completely free of the wheel. Be sure that key does not get bent by allowing it to ride up the key way edge. The slightest bend will prevent quick assembly. Should this occur, replace the key stock.
8. Remove the shaft, supporting the weight of the wheel, particularly for larger diameter wheels. Do not allow the weight of the shaft to be supported by one bearing as you disassemble.
9. Remove the wheel through the discharge or outlet area of the blower housing.
10. Reassemble in reverse order, centering the wheel between the edges of the inlet venturi. If bearings were removed or replaced, be sure to reuse any shim stock found between the mounting support/plate and bearing housings.
11. Torque all hardware.

Disconnect and lock-out power from the unit anytime service is being performed on the fan section. Failure to do so could result in serious injury or death due to the fan turning on while work is in progress.

Fan Motor

1. Shut off unit power and lock out.
2. Disconnect and tag power wires at motor terminals.
3. Loosen motor base-to-mounting-rail attaching bolts.
4. Mark belt as to position. Remove and set aside belts.
5. Remove motor bracket hold down bolts.
6. Remove motor pulley and set aside.
7. Remove motor.
8. Install new motor. Reassemble by reversing steps 1 - 6. Be sure to reinstall multiple belts in their original position. Use a complete new set if required. Do not stretch belts over sheaves. Review the sections on motor and sheave installation, sheave alignment, and belt tensioning discussed previously.
9. Reconnect motor leads and restore power. Check fan for proper rotation as described in Start-Up Check List.

Fan Shaft Bearings

General – When removing and replacing the bearings, care should be taken to ensure that the area where the bearings fit on the shaft does not become scored or damaged. The shaft in this area should be thoroughly cleaned before the bearing is removed and again before the new bearing is installed.

Mounting Details –

1. Check the shaft - it should be straight, free of burrs and full size. Be sure the bearing is not seated on a worn section of shafting.
2. Make certain any set screws are not obstructing the bearing bore.
3. Align the bearing in its housing and slide the bearing into position on shaft - never hammer the ends of the inner race. If necessary, use a brass bar or pipe against the inner race to drift bearing into place - never hit the housing, as bearing damage may result. Make sure there is lubricant between the bearing outer ring and the housing.
4. Fasten the bearing housing to the unit mounting support with hex head cap screws, washers, new lock washers and hex nuts before securing the bearing to the shaft. This permits the bearing to align itself in position along the shaft and eliminates any possibility of cramping loads.
5. Rotate the shaft to make certain it turns freely.
6. Bearings may employ one of several different methods to lock the bearing to the shaft.

Shaft should be free from burrs. If old shaft is used, be sure a ball bearing is not seated on worn section and shaft is not bent.

There are various degrees of self-alignment in bearings of the same manufacturer. The force required for the self-alignment of the bearings used in JOHNSON CONTROLS manufactured units has been specified and is closely monitored at the factory. If it is necessary to purchase a bearing locally, be sure it can be worked around in the housing with a short shaft made of wood or other soft material placed in the bearing.

Prior to installing the bearing on the shaft, it should be worked around in the housing to make sure that self-alignment will be obtained where the bearing is installed. After the shaft journal has been inspected for cleanliness, metal chips or burrs, the bearing is slipped, not forced, onto the shaft. Forcing the bearing onto the shaft by the use of flange, pillow block, or outer ring will damage the bearing internally. Force applied in this way transmits the load to the inner race through the balls in the bearing. Since the bearings are not designed for axial loading, the sides of the races in which the balls turn can be damaged. If the bearing cannot be made to slip onto the shaft by pressing on the inner ring of the bearing, check the shaft for burrs. Install the bearing so the part of the inner race, which receives the locking collar or contains setscrews, is toward the outside of the unit.

If the grease fitting must be changed on bearings that utilize a locking pin under the fitting, it is important to properly replace it. If an adapter or grease fitting of improper size and length is used, the locking pin may be either too tight or loose and can affect the alignment and re-lubrication of the bearing.

Bearing Lock Devices

Various types of locking devices are used to secure bearing(s) to the fan shaft. *Refer to the instructions packed with bearings for special information.* Figure 4-5 is a typical bearing with a setscrew-type locking device. The various locking devices can be classified under basic types: eccentric locking type, concentric locking type, and Skwezloc type.

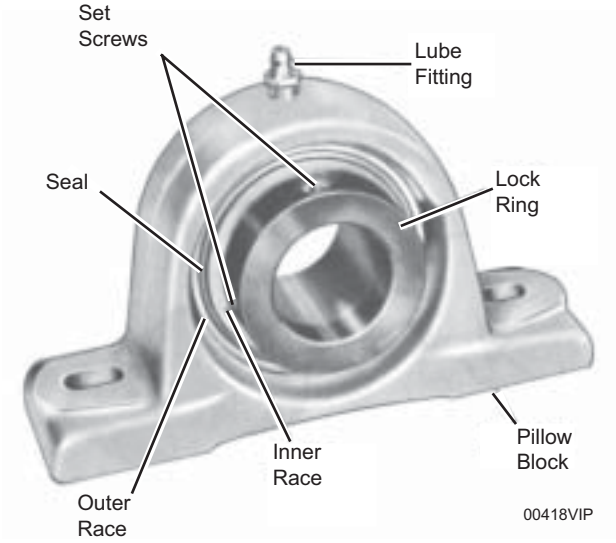


FIG. 4-5 – BEARING WITH SETSCREW TYPE LOCKING DEVICE

Eccentric Type

An eccentric self-locking collar is turned and driven with a punch in the direction of shaft rotation to lock the bearing inner ring to the shaft. *See Figure 4-7.*

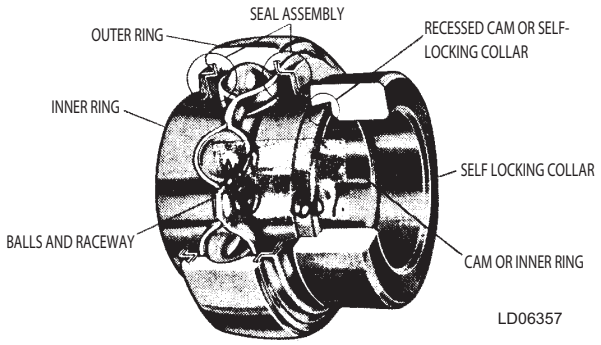


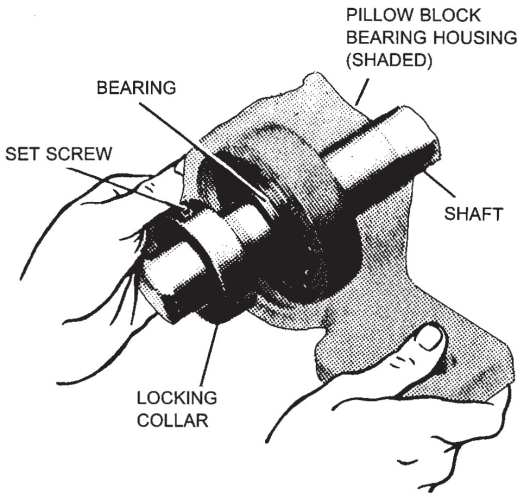
FIG. 4-6 – BEARING WITH ECCENTRIC CAM

When the eccentric collar is engaged to the cam on the bearing inner ring and turned in direction of rotation, it grips the shaft with a positive binding action. The collar is then locked in place with the setscrew provided in the collar.

The self-locking collar is placed on the shaft with its cam adjacent to the cam on the end of the bearing's wide inner ring. In this position, with collar and bearing cams disengaged, the collar's bore is concentric with that of the bearing's inner ring. The wide inner ring is loose on the shaft. By turning the collar in the direction of normal shaft rotation, the eccentric recessed cam will drop over and engage with the corresponding cam on the bearing inner, causing it to grip the shaft tightly with a positive binding action. *See Figure 4-6 & 4-7*. Make sure the two cams engage smoothly and the locking collar is down flat against the shoulder of the inner ring. The wide inner ring is now locked to the shaft. Using a punch or similar tool in the drilled hole of the collar, tap the tool lightly to lock the collar in the direction of normal shaft rotation.

As a final step, the setscrew is tightened. Torque per Table 4-2. It exerts a wedging action to hold the collar always in the engaged position, even under shock and reversing loads.

To disassemble, loosen the setscrew and tap the collar in the direction opposite shaft rotation.



NOTE: Do Not apply excessive force to the bearing housing (pillow block or flange when installing the bearing on the shaft.

CAUTION

Do not apply excessive force to the bearing housing (pillow block or flange) when installing the bearing on the shaft.

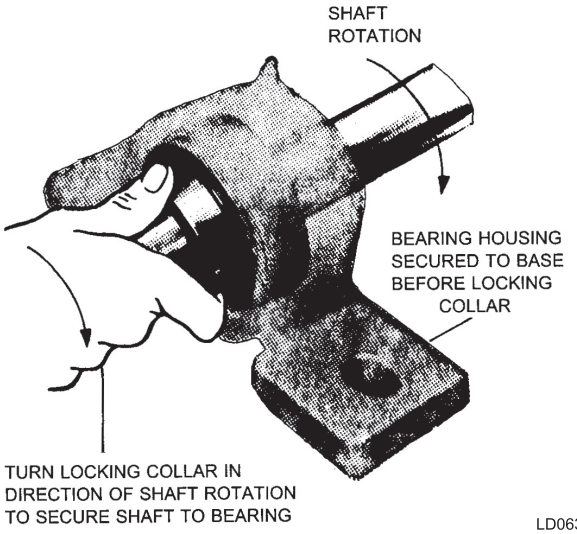


FIG. 4-7 – ECCENTRIC CAM LOCKING COLLAR BEARING INSTALLATION

TABLE 4-2 – SET SCREW TORQUE

SET SCREW DIA.	HEX. SIZE ACROSS FLATS LBS.	MIN. RECOMMENDED TORQUE	
		INCH LBS.	FOOT LBS.
1/4 1/8	66 - 85	5.5 - 7.2	
5/16	5/32	126 - 164	10.5 - 13.7
3/8 3/16	228 - 296	19.0 - 24.7	
7/16	7/32	348 - 452	29.0 - 37.7
1/2 1/4	504 - 655	42.0 - 54.6	
5/8 5/16	1104 - 1435	92.0 - 119.6	

Torquing of Set-screws

1. Torque screw "A" to 1/2 recommended torque.
2. Torque screw "B" to full min. recommended value.
3. Torque screw "A" to full recommended value.

CAUTION

After proper installation of the bearing(s), run the unit for 10 to 15 minutes. Shut the unit down and lock it out. Check for proper engagement of locking collar and tightness of set screw(s).

When replacing split bearings, refer to manufacturer's instruction provided with the bearing. It is extremely important to ensure that proper radial clearances are observed between the roller bearings and outer face. Failure to make proper adjustments will cause premature failure of the bearing.

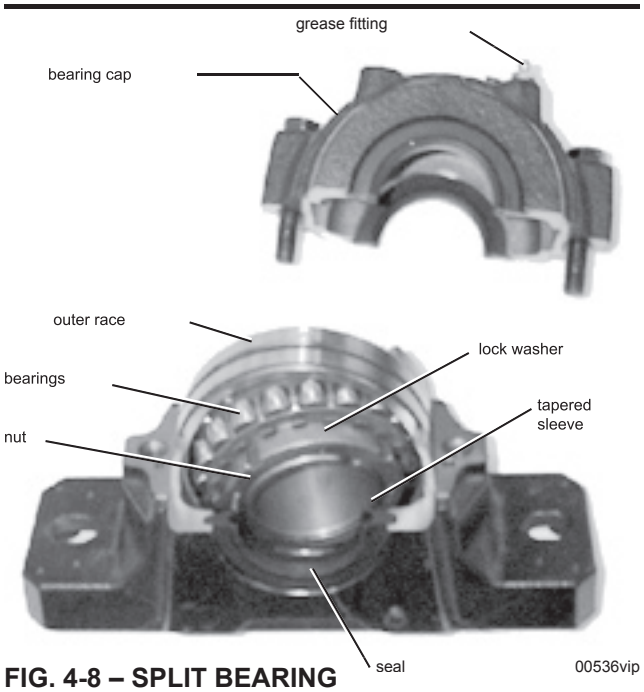


FIG. 4-8 – SPLIT BEARING

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SECTION 5 – SEQUENCE OF OPERATION

UNIT TYPE

The Simplicity Control is capable of being configured for either Constant Volume (CV) or Variable Air Volume (VAV) operation. To configure the unit for VAV operation a 10,000 to 20,000 ohm resister must be installed on the P7 (CV/VAV) connector on the control board. If no resister is installed the unit is configured for CV operation. The control board should already be configured from the factory based on the type of unit that was ordered. However, this item should be verified at the time of start up. This feature will also need to be configured if a replacement control board is installed.

OCCUPIED / UNOCCUPIED MODE

The unit can be placed in the occupied or unoccupied mode by four different methods.

- Digital Input - A switch, external time clock, etc. can be used to close a 24 volt AC circuit between the *"R"* and *"OCC"* connection on the field connection terminal block of the Simplicity control board. When the circuit is closed, the unit is in the Occupied mode. If the circuit is open, the unit is in the unoccupied mode. In order to use this feature *"OCCUPIED INPUT ENABLED"* must be enabled using Parameter 71 under the PROGRAM key on the Simplicity control board or under the SYSTEMS OPTIONS tab in the Simplicity PC software package.
- Internal Schedule – The Simplicity Control can be programmed for a weekly schedule that allows two occupied and two unoccupied times for each day. The control can also be configured for up to 20 Holiday schedules. The start date, time, and number of days can be programmed in for each holiday. The weekly schedule can be programmed using the WEEKLY SCHEDULE SETTINGS tab in the Simplicity PC software package. The holiday schedule can be programmed using the HOLIDAY SCHEDULE tab in the Simplicity PC software package. In order to use this feature *"OCCUPIED INPUT ENABLED"* must be disabled using Parameter 71 under the PROGRAM key on the Simplicity control board or under the SYSTEMS OPTIONS tab in the Simplicity PC software package.
- An *"Occupancy Command"* can be entered into the Simplicity Control using the Modbus communication feature. In order to use this feature *"OCCUPIED INPUT ENABLED"* must be enabled using Parameter 71 under the PROGRAM key on the Simplicity control board or under the SYSTEMS OPTIONS tab in the Simplicity PC software package.
- Space Sensor with Unoccupied Override Button – If the Override Button is pushed on the space sensor the control will switch to the Occupied mode until the Unoccupied Override Time has expired. The Unoccupied Override Time can be set between 0 and 240 minutes. The *"UNOCCUPIED OVERRIDE TIME"* can be programmed by selecting Parameter 9 using the Simplicity control board PROGRAM key or by using the SYSTEMS OPTION tab in the Simplicity PC software package.

CONSTANT VOLUME MODE (CV)

A Constant Volume (CV) unit can be controlled by four methods:

- Stage thermostat
- Communicated Space Temperature
- Hardwired Space Temperature
- Stand Alone

The control is self-configuring based on the inputs that are present. The controls means are listed in their order of priority. If the Simplicity Control sees a thermostat input it will respond to that input regardless of the status of the Space Temperature input. This feature allows the Service Technician to easily energize a cooling or heating function for troubleshooting regardless of a space temperature input.

As long as the Simplicity Control is receiving a space temperature input from the BAS system, it will use the communicated value instead of a hard wired space temperature input.

The following parameters must be programmed to allow cooling and/or heating operation:

"COOLING MODE OPERATION ENABLED" – must be enabled using Parameter 53 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.

"HEATING MODE ENABLED FOR OPERATION" – must be enabled using Parameter 54 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.

Thermostat Input

The Simplicity Control is set up to receive the following cooling/heating inputs from the thermostat:

The following System parameters must be programmed through the simplicity control:

"CV OCCUPIED COOLING SETPOINT" - This parameter must be programmed to 99.0º F. This can be programmed using parameter 10 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.

"CV OCCUPIED HEATING SETPOINT" - This parameter must be programmed to 45.0º F. This can be programmed using parameter 11 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.

"CV UNOCCUPIED COOLING SETPOINT" - This parameter must be programmed to 99.0º F. This can be programmed using parameter 12 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.

"CV UNOCCUPIED HEATING SETPOINT" - This parameter must be programmed to 45.0º F. This can be programmed using parameter 13 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.

The unit uses tandem compressors, two compressors for System 1 and two compressors for System 2.

Occupied Cooling

- Y1 – First Stage of Cooling – 1st compressor from System 1.
- Y2 – Second Stage of Cooling – 2nd compressor from System 1.
- Y3 – Third Stage of Cooling – 1st compressor from System 2.
- Y4 – Fourth Stage of Cooling – 2nd compressor from System 2.

Unoccupied Cooling

Unoccupied cooling operation is the same as Occupied. A programmable thermostat would be required in order to change the cooling temperature settings between occupied and unoccupied.

If the Simplicity Control receives both a *"Y"* cooling call and *"W"* heating call at the same time the control will function and operate in the heating mode.

The YPAL 50 to 65-ton unit has four stages of mechanical cooling available and it is recommended that a four stage cooling thermostat be used. However, a two stage cooling thermostat could be used by connecting Y1 from the thermostat to Y1 and Y2 on the Simplicity field connection terminal block and Y2 from the thermostat to Y3 and Y4 on the Simplicity field connection terminal block.

In this mode of operation, the Simplicity will operate as a two-stage control. On the 50 to 65 ton unit the compressors will be grouped as follows:

- First stage – Compressors 1A and 1B – System 1 compressors – minimum 30 second delay between compressors.
- Second stage – Compressors 2A and 2B – System 2 compressors – minimum 30 second delay between compressors.

Occupied Heating

There are three stages of heating available:

- W1 – First Stage of Heating
- W2 – Second Stage of Heating
- W3 – Third Stage of Heating

See the Heating section of this manual for a description of the heating staging.

Unoccupied Heating

Unoccupied heating operation is the same as Occupied. A programmable thermostat would be required in order to change the heating temperature settings between occupied and unoccupied.

Space Sensor – Hard Wired or Communicated

The following System Parameters must be programmed through the Simplicity Control:

- *"CV OCCUPIED COOLING SETPOINT"* – using Parameter 10 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- *"CV OCCUPIED HEATING SETPOINT"* – using Parameter 11 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.
- *"CV UNOCCUPIED COOLING SETPOINT"* – using Parameter 12 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- *"CV UNOCCUPIED HEATING SETPOINT"* – using Parameter 13 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.

Cooling Operation – Occupied or Unoccupied

The Simplicity Control will stage on the cooling as follows:

- At cooling start up
  - If the space temperature is between 1.5° F and 1.9° F above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will turn on the first compressor from System 1 and turn on a 5 minute timer.
  - If after 5 minutes the space temperature is between 1.5° F and 1.9° F above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the second compressor of System 1 and start a 5-minute timer.

  OR
  - If the space temperature is greater than 2.0° F or more above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the first compressor from System 1 and start a 3 minute timer. After 30 seconds, the control will bring on the second compressor from System 1.
- If after 3 or 5 minutes the space temperature is between 1.5° F and 1.9° F above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the first compressor from System 2 and start a 5 minute timer.
- If after 3 or 5 minutes the space temperature is 2.0° F or more above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the first compressor of System 2 and start a 3 minute timer.
- If after 3 or 5 minutes the space temperature is 1.5° F or more above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the second compressor of System 2.

The Simplicity Control will stage off the cooling as follows:

- If the space temperature is within 0.5° F of the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control turns off the System 2 compressors, if on, with a 30 second delay between the compressors provided the minimum compressor run times have been satisfied.
- If the space temperature is equal to or below the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control turns off the System 1 compressors with a 30 second delay between the compressors provided the minimum compressor run times have been satisfied.

The Simplicity Control has the following timing cooling functions:

- Minimum off time of 5 minutes.
- Minimum on time of 3 minutes – This parameter can be programmed from between 1 and 10 minutes using the COOLING SETUP tab of the in the Simplicity PC software package.

Heating Operation – Occupied or Unoccupied

The Simplicity Control will stage on the heat as follows:

- When the space temperature is 1.5° F – 1.9° F below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the control energizes the first stage of heat.
- When the space temperature is 2.0° F – 2.4° F below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the control energizes the second stage of heat.
- When the space temperature is 2.5° F or more below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the control energizes the third stage of heat.

The Simplicity Control will stage off the heat as follows:

- When the space temperature is 2.4° F below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the third stage of heating will turn off.
- When the space temperature is 1.9° F below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the second stage of heat will turn off.
- When the space temperature is 0.1° F above the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the first stage of heating will turn off.

The Simplicity Control has the following heating timing functions:

- A minimum off time of 2 minutes.
- A minimum on time of 3 minutes.
- There is a 30 second time delay between stages.

Stand Alone

The following System Parameters must be programmed through the Simplicity Control:

- *"CV OCCUPIED COOLING SETPOINT"* – using Parameter 10 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- *"CV OCCUPIED HEATING SETPOINT"* – using Parameter 11 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.
- *"CV UNOCCUPIED COOLING SETPOINT"* – using Parameter 12 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.

- *"CV UNOCCUPIED HEATING SETPOINT"* – using Parameter 13 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.
- *"SPACE SENSOR FAULT OVERIDE ENABLED"* must be turned on – using Parameter 8 under the PROGRAM key on the Simplicity control board or under the SYSTEM OPTIONS tab in the Simplicity PC software package.

Cooling Operation – Occupied or Unoccupied

The Simplicity Control will stage on the cooling as follows:

- At cooling start up
  - If the return air temperature is between 1.5° F and 1.9° F above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will turn on the first compressor from System 1 and turn on a 5 minute timer.
  - If after 5 minutes the return air temperature is between 1.5° F and 1.9° F above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the second compressor of System 1 and start a 5-minute timer.

  OR
  - If the return air temperature is greater than 2.0° F or more above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the first compressor from System 1 and start a 3 minute timer. After 30 seconds, the control will bring on the second compressor from System 1.
- If after 3 or 5 minutes the return air temperature is between 1.5° F and 1.9° F above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the first compressor from System 2 and start a 5 minute timer.
- If after 3 or 5 minutes the return air temperature is 2.0° F or more above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the first compressor of System 2 and start a 3 minute timer.
- If after 3 or 5 minutes the return air temperature is 1.5° F or more above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control will bring on the second compressor of System 2.

The Simplicity Control will stage off the cooling as follows:

- If the return air temperature is within 0.5° F of the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control turns off the System 2 compressors, if on, with a 30 second delay between the compressors provided the minimum compressor run times have been satisfied.
- If the return air temperature is equal to or below the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the control turns off the System 1 compressors with a 30 second delay between the compressors provided the minimum compressor run times have been satisfied.

The Simplicity Control has the following timing cooling functions:

- Minimum off time of 5 minutes.
- Minimum on time of 3 minutes – This parameter can be programmed from between 1 and 10 minutes using the COOLING SETUP tab of the in the Simplicity PC software package.

Heating Operation – Occupied or Unoccupied

The Simplicity Control will stage on the heat as follows:

- When the return air temperature is 1.5° F – 1.9° F below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the control energizes the first stage of heat.
- When the return air temperature is 2.0° F – 2.4° F below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the control energizes the second stage of heat.
- When the return air temperature is 2.5° F or more below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the control energizes the third stage of heat.

The Simplicity Control will stage off the heat as follows:

- When the return air temperature is 2.4° F below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the third stage of heating will turn off.
- When the return air temperature is 1.9° F below the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the second stage of heat will turn off.
- When the return air temperature is 0.1° F above the *"CV OCCUPIED HEATING"* or *"CV UNOCCUPIED HEATING SETPOINT"* the first stage of heating will turn off.

The Simplicity Control has the following heating timing functions:

- A minimum off time of 2 minutes.
- A minimum on time of 3 minutes.
- There is a 30 second time delay between stages.

VARIABLE AIR VOLUME (VAV)

A Variable Air Volume (VAV) unit can be controlled by four methods:

- Stage thermostat
- Communicated Space Temperature
- Hardwired Space Temperature
- Stand Alone - Return Air Temperature

Cooling - Occupied with Thermostat

The following System Parameters must be programmed through the Simplicity Control for VAV operation:

- *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"* – using Parameter 23 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* – using Parameter 24 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.

The Simplicity Control initiates compressor operation as follows:

- The Simplicity Control will turn compressors on and off based of the difference between the supply air temperature and the cooling set point.
- With no thermostat call or a Y1 first stage call the Simplicity Control will control to the *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"*. The Y1 input is not required to initiate compressor operation.
- When there is a Y2, Y3, or Y4 call from the thermostat the Simplicity Control will control to the *"VAV COOLING SUPPLY TEMP LOWER SETPOINT"*.
- The control uses a 5-degree dead band around the cooling *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.
- When the supply air temperature is 5.0° F or more above the cooling *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* the Simplicity Control will energize the first compressor.
- The control records the supply air temperature right before the compressor is turned on and compares it to the supply air temperature after 5 minutes of operation.
- A second compressor will be turned on if both of the following criteria are met:
  - The supply air temperature is still 5.0° F or more above the *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.

  - The Simplicity Control uses the temperature difference calculated when the first compressor was turned on to verify the supply air temperature will not drop 5.0° F or more below the cooling *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*. If turning a compressor on would result in the specified drop in supply air temperature, the second compressor will not be turned on.
- The same logic will be used to stage on compressor 3 and 4.

The Simplicity Control turns off compressor operation as follows:

- The supply air temperature is 5.0° F or more below the *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.
- It has been more than 5-minutes since the last compressor was turned on.
- The compressors will be turned off in the reverse order they were turned on.

Cooling – Unoccupied with Thermostat

The operation is the same as Occupied Cooling with a Thermostat except:

- A Y1 call will energize the supply fan.
- The Simplicity Control will not bring on compressors until the supply air temperature is 5.0° F or more above the *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.
- Both of the above criteria must be met before the Simplicity Control will bring on compressors.

Occupied or Unoccupied Heating with a Thermostat

The following parameter must be programmed through the Simplicity Control:

- *"VAV OCCUPIED HEATING ENABLED"* – must be turned on using Parameter 26 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.

Any W thermostat input will energize all the available heat stages with a 30 second delay between stages.

Occupied Cooling with Hard Wired or Communicated Space Sensor

The following System Parameters must be programmed through the Simplicity Control for VAV operation with a space sensor:

- *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"* – using Parameter 23 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* – using Parameter 24 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- *"VAV SUPPLY AIR TEMP RESET SETPOINT"* – using Parameter 25 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.

The Simplicity Control will control the operation of the compressors as follows:

- If the space temperature is 2.0° F or more above the *"VAV SUPPLY AIR TEMP RESET SETPOINT"* the control will use the *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.
- If the space temperature is not 2.0° F or more above the *"VAV SUPPLY AIR TEMP RESET SETPOINT"* the control will use the *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"*.
- If the control is using the *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* per above the space temperature must be equal to or less than the *"VAV SUPPLY AIR TEMP RESET SETPOINT"* before the control would switch to the *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"*.
- The control uses a 5-degree dead band around the cooling "*VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWERT SETPOINT"*.

- When the supply air temperature is 5.0° F or more above the cooling *"VAV UPPER COOLING SAT SETPOINT"* or *"VAV LOWER COOLING SAT SETPOINT"* the Simplicity Control will energize the first compressor.
- The control records the supply air temperature right before the compressor is turned on and compares it to the supply air temperature after 5 minutes of operation.
- A second compressor will be turned if both of the following criteria are met:
  - The supply air temperature is still 5.0° F or more, greater then the *"VAV UPPER COOLING SAT SETPOINT"* or *"VAV LOWER COOLING SAT SETPOINT"*.
  - The Simplicity Control uses the temperature difference calculated when the first compressor was turned on to verify the supply air temperature will not drop 5.0° F or more below the cooling *"VAV UPPER COOLING SAT SETPOINT"* or *"VAV LOWER COOLING SAT SETPOINT"*. If turning on a compressor would result in the specified drop in supply air temperature, the second compressor will not be turned on.
- The same logic will be used to stage on compressor 3 and 4.

The Simplicity Control turn off compressor operation as follows:

- The supply air temperature is 5.0° F or more below the *""VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.
- It has been more than 5-minutes since the last compressor was turned on.
- The compressors will be turned off in the reverse order they were turned on.

Cooling – Unoccupied with a Hard Wired or Communicated Space Sensor

The Simplicity Control cannot operate unoccupied cooling with this method of control.

Heating – Occupied with a Hard Wired or Communicated Space Sensor

The following parameter must be programmed into the Simplicity Control:

- *"VAV OCCUPIED HEATING ENABLED"* – This must be turned on using Parameter 26 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.
- *"MORNING WARM-UP/ VAV RETURN AIR TEMP SETPOINT"* – using Parameter 29 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.
- *"VAV OCCUPIED HEATING SETPOINT"* – using Parameter 27 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.

The unit will initiate Occupied Heating when the following criteria is met:

- The space temperature is 2.0° F less than the *"VAV OCCUPIED HEATING SETPOINT"*.
- The return air temperature is 0.1° F below the *"MORNING WARM UP / VAV RETURN AIR TEMP SETPOINT"*.

The unit will terminate Occupied Heating when the:

- The return air temperature is equal to the *"MORNING WARM UP RAT SETPOINT"*.

The *"VAV OCCUPIED HEATING SETPOINT"* should always be set below the *"MORNING WARM UP RAT SETPOINT"*.

Heating – Unoccupied with a Hard Wired or Communicated Space Sensor

The Simplicity Control cannot operate unoccupied heating with this method of control.

Occupied Cooling – Stand Alone

The following System Parameters must be programmed through the Simplicity Control for VAV Stand Alone operation:

- "VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT" – using Parameter 23 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- "VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT" – using Parameter 24 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- "VAV SUPPLY AIR TEMP RESET SETPOINT" – using Parameter 25 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.
- "SPACE SENSOR FAULT OVERRIDE ENABLED" must be turned on – using Parameter 8 under the PROGRAM key on the Simplicity control board or under the SYSTEM OPTIONS tab in the Simplicity PC software package.

The Simplicity Control will control the operation of the compressors as follows:

- If the return air temperature is 2.0° F or more above the "VAV SUPPLY AIR TEMP RESET SETPOINT" the control will use the "VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT".
- If the return air temperature is not 2.0° F or more above the "VAV SUPPLY AIR TEMP RESET SETPOINT" the control will use the "VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT".
- If the control is using the "VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT" per above the return air temperature must be equal to or less than the "VAV SUPPLY AIR TEMP RESET SETPOINT" before the control would switch to the "VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT".
- The control uses a 5-degree dead band around the cooling "VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT" or "VAV COOLING SUPPLY AIR TEMP LOWERT SETPOINT".
- When the supply air temperature is 5.0° F or more above the cooling "VAV UPPER COOLING SAT SETPOINT" or "VAV LOWER COOLING SAT SETPOINT" the Simplicity Control will energize the first compressor.
- The control records the supply air temperature right before the compressor is turned on and compares it to the supply air temperature after 5 minutes of operation.
- A second compressor will be turned on if both of the following criteria are met:
  - The supply air temperature is still 5.0° F or more, greater then the "VAV UPPER COOLING SAT SETPOINT" or "VAV LOWER COOLING SAT SETPOINT".
  - The Simplicity Control uses the temperature difference calculated when the first compressor was turned on to verify the supply air temperature will not drop 5.0° F or more below the cooling "VAV UPPER COOLING SAT SETPOINT" or "VAV LOWER COOLING SAT SETPOINT". If turning on a compressor would result in the specified drop in supply air temperature, the second compressor will not be turned on.
- The same logic will be used to stage on compressor 3 and 4.

The Simplicity Control turns off compressor operation as follows:

- The supply air temperature is 5.0° F or more below the ""VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT" or "VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT".
- It has been more than 5-minutes since the last compressor was turned on.
- The compressors will be turned off in the reverse order they were turned on.

Cooling – Unoccupied Stand Alone

The Simplicity Control cannot operate unoccupied cooling with this method of control.

Heating – Occupied Stand Alone

The following parameters must be programmed into the Simplicity Control:

- "VAV OCCUPIED HEATING ENABLED" – This must be turned on using Parameter 26 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.
- "MORNING WARM-UP/ VAV RETURN AIR TEMP SETPOINT" – using Parameter 29 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.
- "VAV OCCUPIED HEATING SETPOINT" – using Parameter 27 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.
- "SPACE SENSOR FAULT OVERRIDE ENABLED" must be turned on – using Parameter 8 under the PROGRAM key on the Simplicity control board or under the SYSTEMS OPTIONS tab in the Simplicity PC software package.

The unit will initiate Occupied Heating when the following criteria are met:

- The return air temperature is 2.0° F less than the "VAV OCCUPIED HEATING SETPOINT".
- The return air temperature is 0.1° F below the "MORNING WARM UP / VAV RETURN AIR TEMP SETPOINT".

The "VAV OCCUPIED HEATING SETPOINT" should always be set below the "MORNING WARM UP RAT SETPOINT".

The unit will terminate Occupied Heating when:

- The return air temperature is equal to the "MORNING WARM UP RAT SETPOINT".

Heating – Unoccupied Stand Alone

The Simplicity Control cannot operate unoccupied heating with this method of control.

CONDENSER FAN OPERATION

A call for the operation of compressor 1A or 1B will close an output at terminal CF1 of the P13 connector. This 24 VAC output energizes the 6M contactor and turns on condenser fan 1. This 24 VAC output is also sent to pressure switch PS3. If the discharge pressure rises above 360 psig the PS3 switch closes and energizes the 7M contactor. The 7M contactor then energizes condenser fan 2. If the discharge pressure decreases below 300 psig the PS3 switch opens and de-energizes condenser fan 2.

A call for the operation of compressor 2A or 2B will close an output at terminal CF2 of the P13 connector. This 24 VAC output energizes the 8M contactor and turns on condenser fan 3. This 24 VAC output is also sent to pressure switch PS4. If the discharge pressure rises above 360 psig the PS4 switch closes and energizes the 9M contactor. The 9M contactor then energizes condenser fan 4. If the discharge pressure decreases below 300 psig the PS4 switch opens and de-energizes condenser fan 4.

COOLING COMPRESSOR LOCKOUT

This feature prevents operation of mechanical cooling when the outdoor temperature is below this set point.

- *"OUTDOOR AIR TEMP COOLING LOCKOUT"* - this parameter can be set using the COOLING SETUP tab in the Simplicity PC software package. *This parameter should never be programmed less then 45.0° F*

Sequence of Operation

- If the outdoor temperature is 1.0º F below the *"OUTDOOR AIR TEMP COOLING LOCKOUT"* the Simplicity Elite control will prevent compressor operation.
- When the outdoor temperature is 1.0º F above the *"OUTDOOR AIR TEMP COOLING LOCKOUT"* compressor operation will be permitted.

- If the outdoor air temperature is less then the economizer supply air temperature set point, compressors will not operate regardless of the *"OUTDOOR AIR TEMP COOLING LOCK-OUT"* set point.

LOW AMBIENT OPERATION

A condenser fan VFD can be installed on condenser fan # 1. When this is installed compressor system 1 (compressors 1A and 1B) can operate down to an outdoor temperature of 0.0º F. The VFD is located in an enclosure on the right hand side of the condenser section, to the right of the system 2 compressors.

To enable low ambient operation when a condenser fan VFD is installed, the following parameter must be programmed:

"LOWAMBIENT KITINSTALLED" - is enabled using Parameter 84 under the PROGRAM key of the Simplicity Elite control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

Operation and Pressure Control Range

The VFD controls the speed of the fan based on a discharge pressure setpoint and a differential range. When discharge pressure reaches approximately 270 PSIG, the VFD will start the fan if the Unit Controller is calling for compressor / condenser fan operation. The binary outputs from the Unit Controller are as shown in Table 5-1.

TABLE 5-1 – BINARY OUTPUTS

CONDENSER FAN	CONNECTOR	TERMINAL #	WIRE #	CONTACTOR
1A	P13	1	423	6M

As soon as the contactor is energized, the VFD will be activated and will begin to control. As the pressure rises over the next 80 PSIG (270 – 350 PSIG); the fan speed will increase to full speed at approximately 350 PSIG.

The VFD control input signal originates from the discharge pressure transducer for the compressor system it is controlling. The transducer signal feeds the VFD. The VFD controls the fan speed based on discharge pressure.

Configuration (Jumpers and Potentiometers)

The inverter is configured at the factory. The jumpers must be in the positions shown in Table 5-2.

TABLE 5-2 – VFD JUMPERS

J2	REMOVE	-
J3	REMOVE	
J4	REMOVE	
J5	MIDDLE	
J6	MIDDLE	
J7	IN	
J8	IN	
J9	IN FOR 60 HZ	REMOVE FOR 50 HZ

Potentiometer settings are also preset at the factory. The potentiometers should be in the positions shown in Table 5-3. The potentiometers do not have numerical settings and are set according to the positions indicated. DO NOT change potentiometer settings unless they do not match the positioning of the potentiometers shown in Figure 5-1. Modifying these settings may cause damage to the unit, control problems, and/or poor operating efficiency.

TABLE 5-3 – POTENTIOMETER SETTINGS

P1	P2
350 PSIG	80 PSIG
6 O'CLOCK	6 O'CLOCK

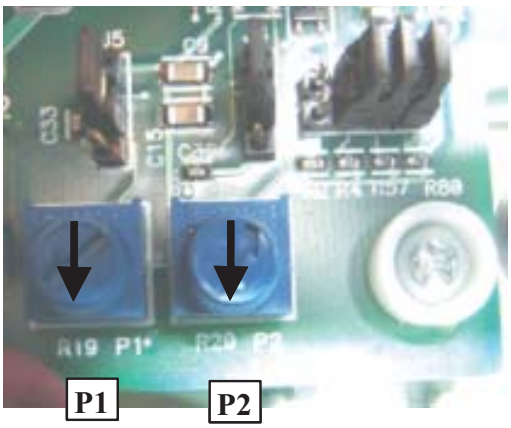

FIG. 5-1 – CONDENSER FAN VFD POTENTIOMETER SETTINGS

5

SUPPLY FAN OPERATION

Constant Volume (CV)

The following values need to be programmed:

"COOL, FAN ON DELAY" – Using parameter 4 under the PROGRAM key on the Simplicity control board or under the FAN tab in the Simplicity PC software package.

"COOL, FAN OFF DELAY" – Using parameter 5 under the PROGRAM key on the Simplicity control board or under the FAN tab in the Simplicity PC software package.

"HEAT, FAN ON DELAY" – Using parameter 2 under the PROGRAM key on the Simplicity control board or under the FAN tab in the Simplicity PC software package.

"HEAT, FAN OFF DELAY" – Using parameter 3 under the PROGRAM key on the Simplicity control board or under the FAN tab in the Simplicity PC software package.

The supply will be energized when:

- The supply fan has been off for 10 seconds and anyone of the following occurs:
  - There is a 24 volt input to terminal "G" of the Simplicity control terminal board.
  - There is a 24 volt input to terminal Y1, Y2, Y3, Y4, W1, W2, or W3 of the Simplicity control terminal board and the "*COOL, FAN ON DELAY"* or *"HEAT, FAN ON DELAY"* have timed out. The *"HEAT, FAN ON DELAY"* timer does not start until the control receives a signal that the gas valve is energized.
  - There is a call for cooling or heating operation initiated by a space sensor demand and the *"COOL, FAN ON DELAY"* or *"HEAT, FAN ON DELAY"* have timed out. The *"HEAT, FAN ON DELAY"* timer does not start until the control receives a signal that the gas valve is energized.
  - If "*CONTINUOUS FAN OPERATION WITH SENSOR"* is turned on using Parameter 55 under the PROGRAM key on the Simplicity control board, or under the FANS tab in the Simplicity PC software package the supply fan will operate continuously whenever the unit is in the occupied mode.
    - If *"TURN OFF CONTINUOUS FAN WHEN START HEAT"* is turned on using Parameter 7 under the PROGRAM key of the Simplicity control board or under the FANS tab in the Simplicity PC software package the supply fan will shut down on a call for heat and then start based on the *"HEAT, FAN ON DELAY"* programmed time.

The supply fan will be de-energized when:

- The supply fan has been on for 30 seconds and anyone of the following occurs:
  - When the 24-volt input to terminal "G" of the Simplicity control terminal board is removed.
  - Any time the 24 volt input to terminal Y1, Y2, Y3, Y4, W1, W2, or W3 of the Simplicity control terminal board is removed and the *"COOL, FAN OFF DELAY"* or *"HEAT, FAN OFF DELAY"* have timed out. The *"HEAT, FAN OFF DELAY"* timer does not start until the control receives a signal that the gas valve is de-energized.
  - Any time there is a call for cooling or heating operation by a space sensor is lost and the *"COOL, FAN OFF DELAY"* or *"HEAT, FAN OFF DELAY"* have timed out. The *"HEAT, FAN OFF DELAY"* timer does not start until the control receives a signal that the gas valve is energized.
  - When the unit goes into the unoccupied mode and there is no call for cooling or heating operation.

The Simplicity Control monitors the operation of the supply fan by checking the status of a digital input from an air proving switch. After 90 seconds of operation, the Simplicity Control looks for a high state (24-volt input) from the air proving switch circuit at the "APS" connections at the P11 connector on the Simplicity control board. If this input does not go to the high state in this time frame the Simplicity Control will set an Air Pressure Switch Unit Lockout, Alarm Code 24 and turn off all outputs.

The Simplicity Control will retry the fan output every 30 minutes for three retries. If after three retires it still cannot qualify the fan, it will continue the alarm and lock out all heating and cooling operation. If the switch closes during one of the restarts, the control will resume normal operation and clear the active alarm.

An Air Pressure Switch Unit Lockout will also be declared if the input goes low, for 2 seconds, during normal supply fan operation.

The Simplicity Control also monitors the supply fan operation in the off cycle. 90 seconds after the digital output from the Simplicity control supply fan circuit goes low (0 volts) the Simplicity Control checks the status of the digital input from the air proving switch circuit. If the state of the circuit remains high (24-volts) the Simplicity Control will set an Air Pressure Switch stuck closed, Alarm Code 25. As soon as the pressure switch opens, the Simplicity Control will resume normal operation.

On a call for supply fan operation, the Simplicity Control sends a 24 VAC signal from the FAN terminal of the P13 connector to the supply fan relay.

Variable Air Volume (VAV)

The supply will be energized when:

- The supply fan has been off for 10 seconds and anyone of the following occurs:
  - The unit is in the occupied mode.
  - The unit is in the Unoccupied heating or cooling mode and there is a 24 volt input to terminal Y1, Y2, Y3, Y4, W1, W2, or W3 of the Simplicity control terminal board and the *"COOL, FAN ON DELAY"* or *"HEAT, FAN ON DELAY"* have timed out. The *"HEAT, FAN ON DELAY"* timer does not start until the control receives a signal that the gas valve is energized.

The supply fan will be de-energized when:

- The supply fan has been on for 30 seconds and anyone of the following occurs:
  - Any time the unit goes unoccupied and there is no call for cooling or heating operation.
  - Any time the 24 volt input to terminal Y1, Y2, Y3, Y4, W1, W2, or W3 of the Simplicity control terminal board is removed and the *"COOL, FAN OFF DELAY"* or *"HEAT, FAN OFF DELAY"* have timed out. The *"HEAT, FAN OFF DELAY"* timer does not start until the control receives a signal that the gas valve is de-energized.

The Simplicity Control monitors the operation of the supply fan by checking the status of a digital input from an air proving switch. After 90 seconds of operation, the Simplicity Control looks for a high state (24-volt input) from the air proving switch circuit at the "APS" connections at the P11 connector on the Simplicity control board. If this input does not go to the high state in this time frame the Simplicity Control will set an Air Pressure Switch Unit Lockout, Alarm Code 24 and turn off all outputs. The Simplicity Control also monitors the duct static pressure input during this time. If the duct static pressure is above 0.05" WC the control will generate a Air Pressure Switch Unit Lockout, Alarm Code 24 but continue to operate.

The Simplicity Control will retry the fan output every 30 minutes for three retries. If after three retires it still cannot qualify the fan, it will continue the alarm and lock out all heating and cooling operation. If the switch closes during one of the restarts, the control will resume normal operation and clear the active alarm.

An Air Pressure Switch Unit Lockout will also be declared if the input goes low, for 2 seconds, during normal supply fan operation.

The Simplicity Control also monitors the supply fan operation in the off cycle. 90 seconds after the digital output from the Simplicity Control supply fan circuit goes low (0 volts) the Simplicity Control checks the status of the digital input from the air proving switch circuit. If the state of the circuit remains high (24-volts) the Simplicity Control will set an Air Pressure Switch stuck closed, Alarm Code 25. As soon as the pressure switch opens the Simplicity Control will resume normal operation.

VAV Supply Fan Speed Control

The following values need to be programmed:

"DUCT PRESSURE SETPOINT" – Using parameter 30 under the PROGRAM key on the Simplicity control board or under the FAN tab in the Simplicity PC software package.

"DUCT PRESSURE SHUTDOWN SETPOINT" – By using the FAN tab in the Simplicity PC software package.

The Simplicity Control uses a proportional-integral control algorithm to maintain the *"DUCT PRESSURE SETPOINT"* by varying the speed of the supply fan. As the duct static pressure goes up the speed goes down.

On a call for supply fan operation the Simplicity Control sends a 24 VAC signal from the FAN terminal of the P13 connector to the supply fan relay.

The Duct Static Pressure Transducer has a range of 0.0 to 5.0" WC. The transducer sends a 0.0 to 5.0 volt DC signal to the Simplicity Control through the DP+ and DP- connections at the P21 connector. The Simplicity Control then sends a 2.0 to 10.0 volt DC signal to the supply fan VFD through the VFD+, VFD- terminals at connector P14 to vary the speed of the VFD.

If the duct static pressure is equal to or greater than the *"DUCT PRESSURE SHUTDOWN SETPOINT"* the Unit Controller will turn off all outputs and lockout until the control is reset.

ECONOMIZER

Economizer is used in the cooling mode only. As soon as the unit switches into Occupied or Unoccupied Cooling and the conditions are within the programmed guidelines for economizer operation the Simplicity Control will attempt to use outdoor air to lower the supply air temperature to the active economizer set point. The Simplicity Control can be configured to use the following economizer control methods:

- Dry Bulb
- Single Enthalpy
- Dual Enthalpy

The following parameter must be programmed to allow economizer operation:

"ECONOMIZER INSTALLED" – must be enabled using Parameter 32 under the PROGRAM key on the Simplicity control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

Dry Bulb

The following parameter must be programmed to allow economizer operation:

"ECONOMIZER OUTSIDE AIR TEMP ENABLE SETPOINT" – must be programmed using Parameter 39 under the PROGRAM key on the Simplicity control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

The economizer will become active and use outdoor air for cooling when:

- The outside air temperature is less then or equal to the *"ECONOMIZER OUTSIDE AIR TEMP ENABLE SETPOINT"*.
- The Simplicity Control has a demand for cooling operation.
- If the outdoor air temperature was above the *"ECONOMIZER OUTSIDE AIR TEMP ENABLE SETPOINT"* when the cooling cycle was initiated, the Simplicity Control will activate economizer operation when the outdoor air temperature is 1.0° F below the *"ECONOMIZER OUTSIDE AIR TEMP ENABLE SETPOINT"*.

The economizer will become inactive and eliminate the use of outdoor air for cooling when:

- The outside air temperature is 1.0° F greater than the *"ECONOMIZER OUTSIDE AIR TEMP ENABLE SETPOINT"*.
- The Simplicity Control does not have an Occupied or Unoccupied cooling demand.

Single Enthalpy

The following parameters must be programmed to allow economizer operation:

"ECONOMIZER OUTSIDE AIR ENTHALPY SETPOINT" – must be programmed using Parameter 37 under the PROGRAM key on the Simplicity control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"OUTSIDE AIR HUMIDITY SENSOR INSTALLED" – must be enabled using Parameter 36 under the PROGRAM key on the Simplicity control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

The economizer will become active and use outdoor air for cooling when:

- The outside air enthalpy is less then or equal to the *"ECONOMIZER OUTSIDE AIR ENTHALPY SETPOINT"*.
- The Simplicity Control has a demand for cooling operation.
- If the outdoor air enthalpy was above the *"ECONOMIZER OUTSIDE AIR ENTHALPY SETPOINT"* when the cooling cycle was initiated the Simplicity Control will activate economizer operation when the outdoor air enthalpy is 1.0 BTU/LB below the *"ECONOMIZER OUTSIDE AIR ENTHALPY SETPOINT"*.

The economizer will become inactive and eliminate the use of outdoor air for cooling when:

- The outside air enthalpy is 1.0 BTU/LB greater than the *"ECONOMIZER OUTSIDE AIR ENTHALPY SETPOINT"*.
- The Simplicity Control does not have an Occupied or Unoccupied cooling demand.

Dual Enthalpy

The following parameter must be programmed to allow economizer operation:

"RETURN AIR HUMIDITY SENSOR INSTALLED" – must be enabled using Parameter 38 under the PROGRAM key on the Simplicity control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

"DIFFERENTIAL ENTHALPY MODE ENABLED" must be turned ON under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

The economizer will become active and use outdoor air for cooling when:

- The outside air enthalpy is 1.0 BTU/LB less then the return air enthalpy.
- The Simplicity Control has a demand for cooling operation.

The economizer will become inactive and eliminate the use of outdoor air for cooling when:

- The outside air enthalpy is equal to or greater than the return air enthalpy.
- The Simplicity Control does not have an Occupied or Unoccupied cooling demand.

BAS ECONOMIZER OPERATION

This feature allows the outdoor/return air damper to be controlled by an external 2 to 10 VDC input.

The following parameters must be programmed to allow BAS ECONOMIZER OPERATION:

"ECONOMIZER INSTALLED" - must be disabled using Parameter 32 under the PROGRAM key on the Simplicity Control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"OUTSIDE AIR HUMIDITY SENSOR INSTALLED" - must be disabled using Parameter 36 under the PROGRAM key on the Simplicity Control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

"RETURN AIR HUMIDITY SENSOR INSTALLED" - must be disabled using Parameter 38 under the PROGRAM key on the Simplicity Control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

"THIRD PARTY BAS ECONOMIZER INSTALLED" must be enabled using Parameter 58 under the PROGRAM key on the Simplicity Control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

In order to use this feature a 2 to 10 VDC external signal must be sent to the unit through the "BAS ECON +" and "BAS ECON -" connections on the Unit Control board.

Sequence of Operation

The Unit Controller sends the 2 to 10 VDC input signal directly to the analog output terminals "ECO +" and "ECO -" to the damper actuator. A 2 VDC input from the external source will result in a 2 VDC signal to the damper actuator.

If voltage is applied to the "BAS ECON +" and "BAS ECON -" terminals before "THIRD PARTY BAS ECONOMIZER INSTALLED" is enabled the Unit Controller can be damaged.

Constant Volume Economizer Set Point

The following parameter must be programmed to allow economizer operation:

"ECONOMIZER FIRST STAGE SETPOINT" – must be programmed using Parameter 33 under the PROGRAM key on the Simplicity control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"ECONOMIZER SECOND STAGE SETPOINT" – must be programmed using Parameter 34 under the PROGRAM key on the Simplicity control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

The Simplicity Control will try to modulate the outdoor air damper and the compressors to maintain the supply air temperature to +/- 1.0° F of the following set points based on the method of control:

- With a Y1 input from a thermostat the Simplicity Control will use the *"ECONOMIZER FIRST STAGE SETPOINT"*.
- With a Y2, Y3, or Y4 input from a thermostat the Simplicity Control will use the *"ECONOMIZER SECOND STAGE SETPOINT"*.
- When the space temperature is 1.5° F to 1.9° F above the "*CV OCCUPIED COOLING SETPOINT"* or "*CV UNOCCUPIED COOLING SETPOINT"* the Simplicity Control will use the *"ECONOMIZER FIRST STAGE SETPOINT"*.
- When the space temperature is 2.0° F above the *"CV OCCUPIED COOLING SETPOINT"* or *"CV UNOCCUPIED COOLING SETPOINT"* the Simplicity Control will use the "*ECONOMIZER SECOND STAGE SETPOINT"*.

Variable Air Volume Economizer Set Point

The Simplicity Control will try to modulate the outdoor air damper and the compressors to maintain the supply air temperature to +/- 1.0° F of the following set points based on the method of control:

- With a Y1 input from a thermostat the Simplicity Control will use the *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"*.
- With a Y2, Y3, or Y4 input from a thermostat the Simplicity Control will use the *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.
- When the space temperature is less then 2.0° F above the *"VAV SUPPLY AIR TEMP RESET SETPOINT"* the Simplicity Control will use the *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"*.

- When the space temperature is equal to or greater than 2.0° F above the *"VAV SUPPLY AIR TEMP RESET SETPOINT"* the Simplicity Control will use the *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.

Economizer / Compressor Operation

The Simplicity Control will use outdoor air without compressor operation when the following is true:

- Economizer is active.
- The outdoor air temperature is equal to or less then the economizer set point.

The Simplicity Control will use outdoor air with compressor operation when the following is true:

- Economizer is active.
- The outdoor air temperature is above the economizer set point.

When outdoor air and compressor operation is available the compressors operation will be controlled as follows:

- If the supply air temperature is 5.1° F or more above the economizer set point and the Economizer PI output is saturated (100%) the Simplicity Control will turn on a compressor and start a 3 minute timer.
- If after 3-minutes the temperature is still 5.1° F above the economizer set point and the Economizer PI output is saturated (100%) the Simplicity Control will bring on a second compressor and start a three minute timer.
- This sequence would continue until all the compressors on.
- If after the 3-minute timing the supply air temperature is within +/- 5.0° F of the economizer set point no change will be made to the number of compressors operating.
- If after the 3-minute timing the supply air temperature is 5.1° F or more below the economizer set point and the Economizer PI output is low (dampers at the minimum position setting) the Simplicity Control will turn off a compressor.
- As long as the supply air temperature is 5.1° F below the economizer set point and the Economizer PI output is low (damper at minimum position setting) the Simplicity Control will turn off compressors every 3-minutes until all the compressor have been turned off.

Economizer PI Loop (Proportional and Integral)

The Simplicity Control uses a proportional and integral logic (PI loop) to control the operation of the damper actuator. The Simplicity Control monitors the change in the supply air temperature to the economizer set point verses changes to the output to the damper actuator. When the supply air temperature is more then 2.0° F from the economizer set point the Simplicity Control will change the output to the economizer damper 1% every 2 seconds. If the supply air temperature is within +/- 2.0° F of the economizer set point the Simplicity Control will change the output to the economizer damper 0.5% every 2 seconds.

ECONOMIZER LOADING

Economizer Loading is a programmable option that can be used to place an artificial load on the unit to prevent cycling a compressor off when the supply air temperature approaches the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"*.

The following System Parameter must be programmed:

"ECONOMIZER LOADING ENABLE" – must be enabled under the COOLING SETUP tab in the Simplicity PC software package.

"SUPPLY AIR TEMP LIMIT COOLING SETPOINT" must be programmed using the COOLING SETUP tab in the Simplicity PC software package.

"SUPPLY AIR TEMP LIMIT FOR COOLING" must be enabled using the COOLING SETUP tab in the Simplicity PC software package.

Constant Volume

The following conditions must be met in order for Economizer Loading to function:

- The outdoor air temperature must be greater than the return air temperature.
- Economizer must be installed but not active.
- A call for first stage compressor operation only
- The unit must be configured as a Constant Volume unit.
- The unit must be in an occupied or unoccupied cooling mode.

The sequence of operation is as follows:

- When the supply air temperature is 0.1° F less than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* the economizer damper will start to open.
- If the economizer damper opens 100% and the supply air temperature is still 0.1° F less than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* the Simplicity Control will turn off the compressor per the Excessive SAT sequence and close the economizer damper to its minimum position.
- When the supply air temperature is between *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* and the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* plus 5.0° F the economizer damper movement will stop and maintain the current position.
- When the supply air temperature is equal to 5.1° F or more above the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* the economizer damper will close back to its minimum position.

Variable Air Volume

The following conditions must be met in order for Economizer Loading to function:

- The outdoor air temperature must be greater than the return air temperature.
- Economizer must be installed but not active.
- A call for first stage compressor operation only.
- The unit must be configured as a Variable Air Volume unit.
- The unit must be in an occupied or unoccupied cooling mode.

The sequence of operation is as follows:

- When the supply air temperature is 5.1° F less than the *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* the economizer damper will start to open.
- If the economizer damper opens 100% and the supply air temperature is still 5.1° F less than the *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* or *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* the Simplicity Control will turn off the compressor close the economizer damper to its minimum position.
- When the supply air temperature is between *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* and the *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* plus 5.0° F the economizer damper movement will stop and maintain the current position.
- When the supply air temperature is between *"VAV COOLING SUPPLY TEMP LOWER SAT SETPOINT"* and the *"VAV COOLING SUPPLY TEMP LOWER SAT SETPOINT"* plus 7.0° F the economizer damper movement will stop and maintain the current position.
- When the supply air temperature is equal to 5.1° F or more above the *"VAV COOLING SUPPLY TEMP UPPER SAT SETPOINT"* and 5 minutes has expired since the economizer damper started to open, the economizer damper will close back to its minimum position and a second compressor will come on.
- When the supply air temperature is equal to 7.1° F or more above the *"VAV COOLING SUPPLY TEMP LOWER SAT SETPOINT"* and 5 minutes has expired since the economizer damper started to open, the economizer damper will close back to its minimum position and a second compressor will come on.

COMFORT VENTILATION

Comfort Ventilation is a Constant Volume control mode that uses the economizer to control the supply air temperature. When outdoor air conditions allow, the economizer will modulate the outside / return air mix to keep supply air temperatures within the upper and lower Comfort Ventilation set points. The control will modulate the economizer, and energize cooling or heating if necessary, to keep the supply air temperature within the Comfort Ventilation set points, even though the space temperature requirements are satisfied.

The following criteria must be present in order for Comfort Ventilation to function":

- The unit can not be in an active heating or cooling mode.
- The unit must have an economizer installed.
- The unit must be in the occupied mode.
- The unit should be placed in the continuous indoor fan operation mode.
- The unit type must be Constant Volume.

The following parameters must be programmed:

"COMFORT VENTILATION FOR COOLING ENABLED" - must be enabled under the COOLING SETUP tab in the Simplicity PC software package.

"COMFORT VENTILATION FOR HEATING ENABLED" - must be enabled under the HEATING SETUP tab in the Simplicity PC software package.

"COMFORT VENTILATION UPPER SETPOINT" - must be programmed under the COOLING SETUP or HEATING SETUP tab in the Simplicity PC software package.

"COMFORT VENTILATION LOWER SETPOINT" - must be programmed under the COOLING SETUP or HEATING SETUP tab in the Simplicity PC software package.

TABLE 5-4 OPERATION DURING OFF CYCLE

OAT VS OAT COMFORT ZONE	SAT VS SAT COMFORT ZONE	ECON OPERATION	HEAT STAGE	COMP STAGE
BELOW	ABOVE	OPEN	-	-
BELOW	BELOW	-	TURN ON	
BELOW	WITHIN	-	-	-
ABOVE	ABOVE	-	-	TURN ON
ABOVE	BELOW	OPEN	-	-
ABOVE	WITHIN	-	-	-
WITHIN	ABOVE	OPEN	-	-
WITHIN	BELOW	OPEN	-	-
WITHIN	WITHIN	-	-	-

TABLE 5-5 COMPRESSOR ON WHEN SPACE INPUT SATISFIED

OAT VS OAT COMFORT ZONE	SAT VS SAT COMFORT ZONE	ECON OPERATION	HEAT STAGE	COMP STAGE
BELOW	ABOVE	OPEN	-	TURN OFF
BELOW	BELOW	-	TURN ON	TURN OFF
BELOW	WITHIN	-	-	TURN OFF
ABOVE	ABOVE	-	-	LEAVE ON
ABOVE	BELOW	OPEN	-	LEAVE ON*
ABOVE	WITHIN	-	-	LEAVE ON
WITHIN	ABOVE	OPEN	-	TURN OFF
WITHIN	BELOW	OPEN	-	TURN OFF
WITHIN	WITHIN	-	-	TURN OFF

* If the economizer damper opens to 100%, the compressor will turn off and the economizer damper will remain at 100%.

TABLE 5-6 HEAT STAGE ON WHEN SPACE INPUT SATISFIED				
OAT VS OAT COMFORT ZONE	SAT VS SAT COMFORT ZONE	ECON OPERATION	HEAT STAGE	COMP STAGE
BELOW	ABOVE	OPEN	LEAVE ON*	-
BELOW	BELOW	-	LEAVE ON	-
BELOW	WITHIN	-	LEAVE ON	-
ABOVE	ABOVE	-	TURN OFF	TURN ON
ABOVE	BELOW	OPEN	TURN OFF	-
ABOVE	WITHIN	-	TURN OFF	-
WITHIN	ABOVE	OPEN	TURN OFF	-
WITHIN	BELOW	OPEN	TURN OFF	-
WITHIN	WITHIN	-	TURN OFF	-

Sequence of Operation

Tables 5-4 thru 5-6 use the following definitions:

- SAT COMFORT ZONE – the temperature between the *"COMFORT VENTILATION LOWER SETPOINT"* minus 1.0° F and the *"COMFORT VENTILATION UPPER SETPOINT"* plus 1.0° F.
- OAT COMFORT ZONE - the temperature between the *"COMFORT VENTILATION LOWER SETPOINT"* and the *"COMFORT VENTILATION UPPER SETPOINT".*
- OAT – Outdoor Air Temperature.
- SAT – Supply Air Temperature.
- ECON OPERATION – Economizer damper will open to BRING SAT into the SAT COMFORT ZONE.

Conditions of Operation

- In order for compressor operation *"COMFORT VENTILATION FOR COOLING ENABLED"* must be enabled.
- In order for heat stages to operate *"COMFORT VENTILATION FOR HEATING ENABLED"* must be enabled.
- Economizer operation will occur with either, or both, *"COMFORT VENTILATION FOR COOLING ENABLED"* or *"COMFORT VENTILATION FOR HEATING ENABLED"* enabled.

EXCESSIVE SAT (SUPPLY AIR TEMPERATURE) CONTROL

This feature is only available on Constant Volume units. On a Constant Volume unit, the compressors and heat stages are control by the space temperature only, either by thermostat or zone sensor. As long as the room device is calling for cooling or heating the compressors or heating section does not control the actual temperature of the supply air leaving the unit. The enabling of this feature adds a means to prevent low or high supply air temperatures from being delivered to the conditioned space.

Cooling

The following System Parameters must be programmed:

"SUPPLY AIR TEMP LIMIT FOR COOLING ENABLED"- must be enabled using Parameter 14 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.

"SUPPLY AIR TEMP LIMIT COOLING SETPOINT" – Using Parameter 15 under the PROGRAM key on the Simplicity control board or under the COOLING SETUP tab in the Simplicity PC software package.

If a single compressor is energized the control will monitor the supply air temperature and respond as follows:

- The Simplicity Control will monitor the supply air temperature and compare it to the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"*. If the supply air temperature is 0.1° F or more below this value and the compressor minimum run time requirement has been met the Simplicity Control will turn off the compressor.
- The Simplicity Control then starts a 10-minute timer.
- If after 10 minutes the supply air temperature is equal to or greater than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* plus 5.1° F the Simplicity Control will turn the compressor back on provided there is still a demand for the staged off compressor.
- If after 10 minutes the supply air temperature is not less than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* plus 5.1° F Simplicity Control will keep the compressor off until the supply air temperature is equal to or greater than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* plus 5.1° F. The Simplicity Control will then turn the compressor back on provided there is still a demand for the staged off compressor.

If multiple compressors are energized the control will monitor the supply air temperature and respond as follows:

- The Simplicity Control will monitor the supply air temperature and compare it to the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"*. If the supply air temperature is 0.1° F or more below this value and the compressor minimum run time requirement has been met the Simplicity Control will turn off the compressor with the shortest run time.
- The Simplicity Control starts a 10 minute and 3 minute timing sequence.
- If after 3 minutes, the supply air temperature is still 0.1° F below the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* the control will turn off the next compressor with the shortest run time.
- The Simplicity Control will continue to turn off compressors every 3 minutes until the supply air temperature is equal to or greater than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"*.
- If after 10 minutes the supply air temperature is equal to or greater than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* plus 5.1° F the Simplicity Control will turn the staged off compressor(s) back on provided there is still a demand for the use of the staged off compressor.
- If after 10 minutes the supply air temperature is not less than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* plus 5.1° F the Simplicity Control will keep the compressor(s) off until the supply air temperature is equal to or greater than the *"SUPPLY AIR TEMP LIMIT COOLING SETPOINT"* plus 5.1° F. The Simplicity Control will then turn the compressor(s) back on provided there is still a demand for the staged off compressor.

Heating

The following System Parameters must be programmed:

"SUPPLY AIR TEMP LIMIT FOR HEATING ENABLED"- must be enabled using Parameter 16 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.

"SUPPLY AIR TEMP LIMIT HEATING SETPOINT" – Using Parameter 17 under the PROGRAM key on the Simplicity control board or under the HEATING SETUP tab in the Simplicity PC software package.

If a single heat stage is on the control will monitor the supply air temperature and respond as follows:

- The Simplicity Control will monitor the supply air temperature and compare it to the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"*. If the supply air temperature is 0.1° F or more above this value and the heat stage minimum run time has been met the Simplicity Control will turn off the heat stage.

- The Simplicity Control then starts a 3 minute timer.
- If after 3 minutes the supply air temperature is equal to or less than the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"* minus 10.1° F the Simplicity Control will turn the heat stage back on provided there is still a demand for the staged off heat stage.
- If after 3 minutes the supply air temperature is not equal to or less than the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"* minus 10.1° F the Simplicity Control will keep the heat section off until the supply air temperature is equal to or less than the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"* minus 10.1° F. The Simplicity Control will turn the heat stage back on provided there is still a demand for the staged off heat stage.

If multiple heat stages are on the control will monitor the supply air temperature and respond as follows:

- The Simplicity Control will monitor the supply air temperature and compare it to the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"*. If the supply air temperature is 0.1° F or more above this value and the heat stage minimum run time requirement has been met the Simplicity Control will turn off the heat section with the shortest run time.
- The Simplicity Control starts a 3 minute and 30 second timing sequence. If after 30 seconds the supply air temperature is still 0.1° F above the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"*, the control will turn off the next heat stage with the shortest run time.
- The Simplicity Control will continue to turn off heat stages every 30 seconds until the supply air temperature is equal to or less than the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"*.
- If after 10 minutes the supply air temperature is equal to or less than the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"* minus 10.1° F the Simplicity Control will turn the heat stage(s) back on provided there is still a demand for the use of the staged off heat stage.
- If after 10 minutes the supply air temperature is still greater than the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"* minus 10.1° F the Simplicity Control will keep the heat stage(s) off until the supply air temperature is equal to or less than the *"SUPPLY AIR TEMP LIMIT HEATING SETPOINT"* minus 10.1° F. The Simplicity Control will turn the heat stage(s) back on provided there is still a demand for the staged off heat stage.

SPACE SENSOR WITH SET POINT ADJUSTMENT

A space sensor with a 20 K ohm slide potentiometer can be used to reset the Occupied Cooling and Heating set points.

In addition to the use of a space sensor with the slide potentiometer the following parameter must be programmed:

"SPACE TEMPERATURE OFFSET RANGE" – The offset range must be programmed using Parameter 56 under the PROGRAM key on the Simplicity Elite control board or under the SYSTEMS OPTIONS tab in the Simplicity Elite software package.

Sequence of Operation

As the slide potentiometer is moved the Occupied Cooling and Heating set point is changed based on the programmed *"SPACE TEMPERATURE OFFSET RANGE"*. The *"SPACE TEMPERATURE OFFSET RANGE"* can be set from 0 to 5.0° F. For example, if the "*SPACE TEMPERATURE OFFSET RANGE"* is programmed for 3.0° F and the resistance of the potentiometer is lowered the Cooling and Heating set points would be lowered up to 3.0° F. If the resistance is increased the Cooling and Heating set points would be increased up to 3.0° F.

SPACE SENSOR FAULT OVERRIDE ENABLE

The Unit Controller will self configure when it identifies a space sensor has been installed. Once it identifies that a space sensor is connected, if the input is then removed the control will generate a Space Temperature Sensor Alarm (19). When this occurs the unit will continue to operate and will use the return air temperature input in place of the space sensor. If the *"SPACE SENSOR FAULT OVERRIDE ENABLE"* is turned on, the Alarm is removed and the unit will continue to use the return air temperature input until the space sensor input is within range and *"SPACE SENSOR FAULT OVERRIDE ENABLE"* has been turned off.

"SPACE SENSOR FAULT OVERRIDE ENABLE" is enabled using parameter 8 under the PROGRAM key of the Simplicity Elite control board or under the SYSTEMS OPTIONS tab of the Simplicity software package.

Sequence of Operation

When the unit is configured as a Constant Volume unit with space sensor the Simplicity Control will use the same logic for controlling compressors, economizer, and heating that it would use with a space sensor but uses the return air temperature input instead of the space sensor.

When unit is configured for VAV with space sensor, the Simplicity Elite control will use the return air temperature in place of the space sensor to reset between the "*VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"* and the "*VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* based on the return air temperature in relation to the *"VAV SUPPLY AIR TEMP RESET SETPOINT"*.

REMOTE CONTROL

This feature can be used on a VAV unit to send a hardwired 0 to 10 volts signal to the unit to vary the supply air temperature set point between the *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* and *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"*. This feature will only work on a VAV unit with space sensor control.

The following parameter must be enabled in order to use to feature:

"REMOTE CONTROL INPUT ENABLE FOR THIRD PARTY BAS" must be enabled using Parameter 22 under the PROGRAM key of the Simplicity Elite control board or under the SYSTEMS OPTIONS tab of the Simplicity PC software package.

Sequence of Operation

The Simplicity Elite control will vary the active cooling set point per the following:

- Reset voltage less than 1.5 volts DC – No compressor operation.
- Reset voltage 1.5 to 2.0 volts DC - *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"*.
- Reset voltage 10.0 volts DC - *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"*.
- Reset voltage between 2.0 and 10.0 volts DC – linearly between the *"VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT"* and *"VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT"*.
- The hard wired input is connected to the Simplicity Elite control board at the "REM+" and "REM-" terminals of the P19 connector.

REDLINE

The feature can be used to temporally reduce the electrical consumption of the unit by reducing the number of compressor that are turned on. This feature is only available as a communicated input to the Simplicity Elite control. The BACnet name is SET_REDLINE and the BACnet instance number is BV12. For Modbus use address (HEX) 41L, address (DEC) 65L Bit 0.

Sequence of Operation

If three or more compressors are energized when the Simplicity Elite control receives this command the Simplicity Control will turn off compressor number 3 and 4 if energized even if the minimum run time requirement has not been met.

The Simplicity Elite control will keep the compressors off line for 5 minutes. After 5 minutes, the Simplicity Elite control will turn the compressor back on with a 30 second delay between compressors and resume normal operation.

After 5 minutes Simplicity Elite control will reset this communicated input back to "OFF" regardless of the communicated status. To initiate another cycle the communicated value would have to switch to the low state "OFF" and then back to the high state "ON".

LOADSHED

This feature can be used to temporally reduce the electrical consumption of the unit by turning off all the active compressors. The feature is only available as a communicated input to the Simplicity Elite control. The BACnet name is SET_LOADSHED and the BACnet instance number is BV13. For Modbus use address (HEX) 41L, address (DEC) 65L Bit 1.

Sequence of Operation

If compressors are energized when the Simplicity Elite control receives this command the Simplicity Elite control will turn off all compressor immediately, even if the minimum run time requirement has not been met for the compressor.

The Simplicity Elite control will keep the compressors off line for 5 minutes. After 5 minutes, the Simplicity Elite control will turn the compressor back on and resume normal information. The same compressors that were running before the Loadshed input was received will be turned back on with a 30 second delay between compressors.

After 5 minutes, Simplicity Elite control will reset this communicated input back to "OFF" regardless of the communicated status. To initiate another cycle the communicated value would have to switch to the low state "OFF" and then back to the high state "ON".

DIRTY FILTER

A adjustable differential pressure switch can be a added to the unit to monitor the filters and initiate an alarm when the pressure drop across the filters become greater than the setting of the switch. When the switch closes, the alarm will be initiated.

In order to use this feature a pressure switch must be installed and the feature enabled. To enable the dirty filter feature.

"DIRTY FILTER SWITCH INSTALLED" – must be enabled using Parameter 51 under the PROGRAM key of the Simplicity Elite control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

Sequence of Operation

The control monitors the voltage input at terminals "FILT" at the P22 connector on the Simplicity Elite control board. If the status goes high, 24 volt input, for ten minutes the Simplicity Elite control will initiate an Alarm 23 "Dirty Filter Switch Has Tripped" but the operation of the unit will continue.

As soon as the 24-volt input is removed from the input terminals, the alarm will turn off.

METRIC OPERATION

When this feature is turned on all the temperature data will be converted to metric.

The following must be enabled for Metric Operation:

"METRIC OPERATION"- must be enabled using Parameter 57 under the PROGRAM key on the Simplicity Elite control board.

INTELLI-START

This feature can be used to energize the heating or cooling function of the unit to bring the temperature of the space up to the *"CV OCCUPIED COOLING"* and *"CV OCCUPIED HEATING"* set points prior to the start of the occupied period.

The following parameter must be programmed in order to use this feature:

"INTELLI-START OPERATION ENABLE" – must be enabled under the SYSTEMS OPTIONS tab of the Simplicity PC software package.

The following criteria must be met for Morning Warm-up operation:

- Intelli-Start will only work on a Constant Volume system using a space sensor.
- Intelli-Start will only work when the internal scheduling feature is used. It will not work using a hard wired or communicated Occupied command.
- Intelli-Start will only function during the first occupied period of each day.

Sequence of Operation

First day of heating or cooling operation

- Two hours prior to the start of the occupied period the Simplicity Control will compare the space temperature to the *"CV OCCUPIED COOLING"* or the *"CV OCCUPIED HEATING"* set points.
- Heating operation
  - If the space temperature is 1.5° F or more below the *"CV OCCUPIED HEATING"* set point the Simplicity Elite control will stage on the heat using the normal heating with space sensor logic.
  - The Simplicity Elite control will record the space temperature and how long it takes to bring the space temperature to the *"CV OCCUPIED HEATING"* set point.
  - When the *"CV OCCUPIED HEATING"* set point is reached the Simplicity Elite control will divide the elapsed time into 5-minute increments.
  - The Simplicity Elite control will determine how many 0.1° F the temperature was below the *"CV OCCUPIED HEATING"* set point.
  - The Simplicity Elite control will then calculate how many 0.1° F were satisfied per 5-minute increment.
  - This number will be recalculated each day.
  - The Simplicity Elite control also records the outdoor temperature when the above calculations are made.

- Cooling operation
  - If the space temperature is 1.5° F or more above the *"CV OCCUPIED COOLING"* set point the Simplicity Elite control will stage on cooling operation using the normal Cooling with space sensor logic.
  - The Simplicity Elite control will record the space temperature and how long it takes to bring the space temperature to the "*CV OCCUPIED COOLING"* set point.
  - When the *"CV OCCUPIED COO0LING"* set point is reached the Simplicity Elite control will divide the elapsed time into 5-minute increments.
  - The Simplicity Elite control will determine how many 0.1° F the temperature was above the *"CV OCCUPIED COOLING"* set point
  - The Simplicity Elite control will then calculate how many 0.1° F were satisfied per 5-minute increment.
  - This number will be recalculated each day.
  - The Simplicity Elite control also records the outdoor temperature when the above calculations are made.

Subsequent Operation

- Each morning two hours before the scheduled occupied start time the Simplicity Elite control looks at the space temperature and the *"CV OCCUPIED COOLING"* and *"CV OCCUPIED HEATING"* set points and determines if there is a need for cooling or heating operation.
- Based on which need is identified the Simplicity Elite control will calculate the number of 0.1° F increments the space temperature is from set point and multiple this value time the previous days calculation on the number of 0.1° F the unit can satisfy in 5 minutes. This will determine how many minutes prior to the beginning of the occupied period the control will need to start the heating or cooling operation.
- If cooling mode is selected the Simplicity Elite control will also compare the current outdoor temperature to the outdoor temperature recorded during the previous days start up period.
  - If the current outdoor air temperature is 10.0° F or more above the previous day the Simplicity Elite control will add 5 minutes to the above calculated recovery time for every 10.0° F difference.

- If heating mode is selected the Simplicity Elite control will also compare the current outdoor temperature to the outdoor temperature recorded during the previous start up period.
  - If the current outdoor air temperature is 10.0° F or more below the previous day the Simplicity Elite control will add 5inutes to the above calculated recovery time for every 10.0° F difference.
- The outdoor damper will be kept closed during this period unless it is being used to meet the occupied cooling space temperature requirement.
- Even if the space temperature satisfies the "*CV OCCUPIED COOLING"* and *"CV OCCUPIED HEATING"* set points the unit will not switch to the occupied mode until the calculated warm up / cool down time has expired. However, the supply fan will remain energized during this time. If the space temperature rises above the *"CV OCCUPIED COOLING"*, or below the *"CV OCCUPIED HEATING"* set points during this time the cooling or heating will cycle back on.

MORNING WARM-UP

This feature can be used to energize the heating section of the unit to bring the temperature of the space up to conditions prior to the start of the occupied period.

The following parameters must be programmed in order to use this feature:

"MORNING WARM-UP ENABLE" – must be enabled using Parameter 28 under the PROGRAM key of the Simplicity Elite control board or under the HEATING SETUP tab of the Simplicity PC software package.

"MORNING WARM-UP/VAV RETURN AIR TEMP SETPOINT" - must be programmed using Parameter 29 under the PROGRAM key of the Simplicity Elite control board or under the HEATING SETUP tab of the Simplicity PC software package.

"HEATING MODE ENABLED FOR OPERATION" – must be enabled using Parameter 54 under the PROGRAM key of the Simplicity Elite control board or under the HEATING SETUP tab of the Simplicity PC software package.

The following criteria must be met for Morning Warm-up operation:

- Morning Warm-up will only work on a VAV system.
- Morning Warm-up will only work when the internal scheduling feature is used. It will not work using a hard wired or communicated Occupied command.
- Morning Warm-up will only function during the first occupied period of each day.

Sequence of Operation

- One hour before the beginning of the occupied period the Simplicity Elite control will energize the supply fan circuit.
- The Simplicity Elite control will keep the economizer damper closed.
- After 5 minutes of supply fan operation the Simplicity Elite control will compare the return air temperature to the *"MORNING WARM-UP/VAV RETURN AIR TEMP SETPOINT"*.
- If the return air temperature is 2.0° F or more below the "*MORNING WARM-UP/VAV RETURN AIR TEMP SETPOINT"* the Simplicity Elite control will energize all the available heat.
- If the return air temperature is not 2.0° F or more below the *"MORNING WARM-UP/VAV RETURN AIR TEMP SETPOINT"* the Simplicity Elite control will continue supply fan operation while continuing to monitor the return air temperature.
- When the return air temperature is equal to or above the *"MORNING WARM-UP/VAV RETURN AIR TEMP SETPOINT"* heating operation will be de-energized.
- During this time the heat will cycle on and off based on the comparison of the return air temperature to the *"MORNING WARM-UP/VAV RETURN AIR TEMP SETPOINT"*.
- After one hour of operation the Simplicity Elite control will go into the Occupied mode and open the economize to the minimum position.
- Heating operation will continue until the return air temperature is equal to or above the *"MORNING WARM-UP/VAV RETURN AIR TEMP SETPOINT"*.

HYDRONIC HEAT

The following parameters must be programmed to use Hydronic Heat:

"HEATING MODE ENABLED FOR OPERATION" must be enabled using Parameter 54 under the PROGRAM key of the Simplicity Elite control board or under the HEATING SETUP tab in the Simplicity PC software package.

"HYDRONIC HEATING ENABLED" must be enabled using Parameter 18 under the PROGRAM key of the Simplicity Elite control board or under the HEATING SETUP tab in the Simplicity PC software package.

"HYDRONIC HEATING STAGE #1 SUPPLY AIR SETPOINT" must be programmed using Parameter 19 under the PROGRAM key of the Simplicity Elite control board or under the HEATING SETUP tab in the Simplicity PC software package.

"HYDRONIC HEATING STAGE #2 SUPPLY AIR SETPOINT" must be programmed using Parameter 20 under the PROGRAM key of the Simplicity Elite control board or under the HEATING SETUP tab in the Simplicity PC software package.

Sequence of Operation

On Constant Volume units whenever there is a call for the 1st stage of heating operation the Simplicity Elite control will vary a 2 to 10 VDC output to the hydronic valve to try and maintain the supply air temperature to within +/- 1.0° F of the *"HYDRONIC HEATING STAGE #1 SUPPLY AIR SETPOINT"*. The output to the valve can be found at terminal "HWV+" and "HWV-" at connector P14 on the Simplicity Elite control board.

On Constant Volume units whenever there is a call for the 2nd stage of heating operation the Simplicity Elite control will vary a 2 to 10 VDC output to the hydronic valve to try and maintain the supply air temperature to within +/- 1.0° F of the *"HYDRONIC HEATING STAGE #2 SUPPLY AIR SETPOINT"*.

On a VAV unit whenever there is a call for heat the Simplicity Elite control will vary the 2 to 10 VDC output to the hydronic valve to try and maintain the supply air temperature to within ±1º F of the *"HYDRONIC HEATING STAGE #2 SUPPLYAIR SETPOINT"*

The normal output to the valve is 2 VDC for 0% opening of the hydronic valve and 10 VDC for 100% opening of the hydronic valve. If the following is enabled:

"HYDRONIC HEAT ACTUATOR VALVE REVERSE ACTING" must be enabled using Parameter 21 under the PROGRAM key of the Simplicity Elite control board or under the HEATING SETUP tab in the Simplicity PC software package.

Under this condition, the normal output to the valve is 10 VDC for 0% opening of the hydronic valve and 0 VDC for 100% opening of the hydronic valve.

HYDRONIC HEAT FREEZE STAT

All hydronic heat units are equipped with a freeze stat that monitors the temperature of the return air. The switch action is normally closed and opens when the return air temperature is less the 40.0º F. The 24 VAC signal to the freeze stat originates at terminal FSP on the control board. The 24 VAC input from the freeze stat enters the control at the FSI terminal.

When the freeze stat input is lost, the Simplicity Control will send a 10 VDC signal to the valve (direct acting), 2 VDC (reverse acting) to open the valve. The valve will continue to drive open for 5 minutes, even if the freeze stat circuit remakes. If the freeze stat circuit closes and the 5 minute timing has expired, the unit will return to normal operation.

If the supply fan is operating and the outdoor damper is open the Simplicity Control will close the damper during the above sequence.

VENTILATION

The unit can be ordered / programmed for the following ventilation options:

- None.
- Manual.
- Fixed Minimum – Economizer option required.
- Demand Ventilation – Economizer option required.

Manual

This option uses a manually adjustable outdoor air damper that can set in a fixed position to control the amount of outdoor air that is brought into the building for ventilation. As long as the supply fan is operative, ventilation air will be brought into the building. To adjust the damper:

- Loosen the wing nut that holds the adjustment handle in a fixed position.
- Move the handle to the desired position.
- Tighten the wing nut to hold the handle in the desired position.

Fixed Minimum

The following parameters must be programmed to enable Fixed Minimum Ventilation:

"ECONOMIZER INSTALLED" – must be enabled using Parameter 32 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"*ECONOMIZER MINIMUM POSITION"* – must be programmed using Parameter 35 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

Sequence of Operation

The damper will open to the programmed *"ECONOMIZER MINIMUM POSITION"* whenever the following conditions are met:

- The unit is in the occupied mode.
- There must be a 24-volt output from the Simplicity Elite control to the supply fan control circuit. The output is contained at the "FAN" terminal of connector P13 on the Simplicity Elite control board.
- When the economizer becomes active the position of the dampers are controlled by the Economizer PI logic which could move the dampers beyond the *"ECONOMIZER MINIMUM POSITION"*; however, the Economizer PI logic can never close the dampers less then the "*ECONOMIZER MINIMUM POSITION"*.

Demand Ventilation

In this mode the Simplicity Elite control monitors the CO2 level in the conditioned space. The Simplicity Elite control modulates the outdoor air damper beyond the *"ECONOMIZER MINIMUM POSITION"* in order to keep the CO2 level within +/- 100 PPM of the *"IAQ SETPOINT"*.

In order to use this feature a CO2 sensor must be installed in the conditioned space and connected to *"DV+"* and the *"DV-"* terminals of the P20 connector.

The following parameters must be programmed to enable Demand Ventilation:

"ECONOMIZER INSTALLED" – must be enabled using Parameter 32 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"ECONOMIZER MINIMUM POSITION" – must be programmed using Parameter 35 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"DEMAND VENTILATION (IAQ) ENABLED" – must be enabled using Parameter 40 under the PROGRAM key of the Simplicity Elite control board or under the COMFORT / DEMAND VENTILATION tab in the Simplicity PC software package.

"IAQ SENSOR RANGE" - must be programmed using Parameter 41 under the PROGRAM key on the Simplicity Elite control board or under the COMFORT / DEMAND VENTILATION tab in the Simplicity PC software package.

"IAQ SETPOINT" - must be programmed using Parameter 42 under the PROGRAM key on the Simplicity Elite control board or under the COMFORT / DEMAND VENTILATION tab in the Simplicity PC software package.

"MAXIMUM IAQ ECONOMIZER POSITION" – must be programmed under the COMFORT / DEMAND VENTILATION tab in the Simplicity PC software package.

Definitions

"IAQ SENSOR RANGE" –This establishes the span the Simplicity Elite control uses in PPM. 0 PPM would be equal to a 0 volts input to the Simplicity Elite control, *"IAQ SENSOR RANGE"* would be equal to 10 volts input to the Simplicity Elite control. The *"IAQ SENSOR RANGE"* must match the PPM range of the sensor installed in the conditioned space.

"IAQ SETPOINT" – This is the conditioned space CO2 level the Simplicity Elite control is trying to maintain.

"MAXIMUM IAQ ECONOMIZER POSITION" – This is the maximum damper position the Simplicity Elite control will allow the damper to open while in a Demand Ventilation mode no matter how great a differential is between the conditioned space CO2 level and the *"IAQ SETPOINT"*.

Sequence of Operation

The damper will open to the programmed *"ECONOMIZER MINIMUM POSITION"* whenever the following conditions are met:

- The unit is in the occupied mode.
- There must be a 24-volt output from the Simplicity Elite control to the supply fan control circuit. The output is contained at the "FAN" terminal of connector P13 on the Simplicity Elite control board.
- When the economizer becomes active the position of the dampers are controlled by the Economizer PI logic which could move the dampers beyond the *"ECONOMIZER MINIMUM POSITION"*; however, the Economizer PI logic can never close the dampers less then the *"ECONOMIZER MINIMUM POSITION"*.

If the above criteria are met, the Simplicity Elite control will then monitor the CO2 level in the conditioned space and vary the position of the outdoor air damper between the *"ECONOMIZER MINIMUM POSITION"* and the *"MAXIMUM IAQ ECONOMIZER POSITION"* based on the following:

- The Simplicity Elite control will try to maintain the CO2 level in the conditioned space to +/- 100 PPM of the *"IAQ SETPOINT"*.
- If the CO2 level in the conditioned space is greater then the *"IAQ SETPOINT"* + 100 PPM the outdoor air damper will open, but never more than the *"MAXIMUM IAQ ECONOMIZER POSITION*".
- If the CO2 level in the conditioned space is less then the *"IAQ SETPOINT"* - 100 PPM the outdoor air damper will close, but never less then the "*ECONOMIZER MINIMUM POSITION"*.

VENTILATION LOW AMBIENT MINIMUM POSITION RESET

This feature allows the control to reset the minimum ventilation set point to a lower value when the outdoor temperature is cold. This assists in keeper the supply air temperature from dropping because of a fixed ventilation requirement when the outdoor temperature drops.

To use this feature the following parameters need to be programmed:

"LOW AMBIENT ECONOMIZER SETPOINT" – this parameter is programmed under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"LOW AMBIENT ECONOMIZER MINIMUM POSITION" – this parameter is programmed under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

Sequence of Operation

When *"LOW AMBIENT ECONOMIZER SETPOINT"* is programmed to 0 the feature is disabled. To use this feature programmed this parameter to the outdoor temperature at which you want the Simplicity Elite control to switch to the *"LOW AMBIENT "ECONOMIZER MINIMUM POSITION"*. This parameter can be programmed between 0 and 60.0° F.

The parameter *"LOW AMBIENT ECONOMIZER MINIMUM POSITION"* needs to be programmed to the minimum position of the damper when the temperature is below the *"LOW AMBIENT ECONOMIZER SETPOINT"*. This parameter can be programmed between 0 and 99%. It would normally be programmed less then the *"ECONOMIZER MINIMUM POSITION"* parameter.

When the outdoor temperature is equal to or less than the *"LOW AMBIENT ECONOMIZER SETPOINT"* the Simplicity Elite control will set the minimum position of the outdoor damper to the programmed *"LOW AMBIENT ECONOMIZER MINIMUM POSITION"* setting.

When the outdoor temperature is 1.0° F or more above the *"LOW AMBIENT ECONOMIZER SETPOINT"* the Simplicity Control will set the minimum position of the outdoor damper to the programmed *"ECONOMIZER MINIMUM POSITION"* setting.

EXHAUST FAN OPERATION

The Simplicity Elite control can be configured for the following types of exhaust fan operation:

- On/Off Control Based On Outdoor Damper Position.
- On/Off Control Based On Building Pressure.
- Modulating Damper with Fixed Speed Exhaust.
- Modulating Exhaust with a VFD.

On/Off Control Based on Outdoor Damper Position

This exhaust option uses a standard motor without any type of speed control and a barometric damper.

The following System Parameters must be programmed through the Simplicity Elite control:

"POWER EXHAUST INSTALLED" – must be turned on using Parameter 43 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"ECONOMIZER DAMPER POSITION FOR EXHAUST FAN TO TURN ON" – must be programmed using Parameter 48 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"ECONOMIZER DAMPER POSITION FOR EXHAUST FAN TO TURN OFF" – must be programmed using Parameter 49 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

Sequence of Operation

When the output to the economizer damper is equal to or greater then the *"ECONOMIZER DAMPER POSITION FOR EXHAUST FAN TO TURN ON"* the Simplicity Elite control closes the output to the exhaust fan motor. The output is at the *"EXH"* terminal of the P13 connector.

When the output to the economizer damper is equal to or less then the *"ECONOMIZER DAMPER POSITION FOR EXHAUST FAN TO TURN OFF"* the Simplicity Elite control open the output to the exhaust fan motor.

The minimum run time is 10 seconds and the minimum off time is 60 seconds.

On/Off Control Based on Building Pressure

This exhaust option uses a standard motor without any type of speed control and a barometric damper.

The following System Parameters must be programmed through the Simplicity Elite control:

"POWER EXHAUST INSTALLED" – must be turned on using Parameter 43 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"BUILDING STATIC PRESSURE SENSOR INSTALLED" – must be turned on using Parameter 85 under the PROGRAM key on the Simplicity Elite control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

"BUILDING PRESSURE SETPOINT" must be programmed using Parameter 31 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

Sequence of Operation

When the building static pressure is 0.015" WC or more above the *"BUILDING PRESSURE SETPOINT"* the Simplicity Elite control closes the output to the exhaust fan motor. The output is at the "EXH" terminal of the P13 connector.

When the building static pressure is 0.015" WC or more below the *"BUILDING PRESSURE SETPOINT"* the Simplicity Elite control opens the output to the exhaust fan motor.

The minimum run time is 10 seconds and the minimum off time is 60 seconds.

Modulating Damper with Fixed Speed Exhaust

This exhaust option uses a standard motor without any type of speed control and a modulating damper.

The following System Parameters must be programmed through the Simplicity Elite control:

"POWER EXHAUST INSTALLED" – must be turned on using Parameter 43 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"BUILDING STATIC PRESSURE SENSOR INSTALLED" – must be turned on using Parameter 85 under the PROGRAM key on the Simplicity Elite control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

"BUILDING PRESSURE SETPOINT" must be programmed using Parameter 31 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"MODULATING POWER EXHAUST INSTALLED" must be turned on using Parameter 44 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"EXHAUST DAMPER POSITION FOR EXHAUST FAN TO TURN ON" must be programmed using Parameter 46 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"EXHAUST DAMPER POSITION FOR EXHAUST FAN TO TURN OFF" must be programmed using Parameter 47 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

Sequence of Operation

When the building static pressure is 0.025" WC or more above the *"BUILDING PRESSURE SETPOINT"* the Simplicity Elite control sends a 2 to 10 volt DC signal to open the exhaust damper. The output is at the "EXD+" and "EXD-" terminals at the P14 connector.

When the exhaust damper position is equal to or greater than the *"EXHAUST DAMPER POSITION FOR EXHAUST FAN TO TURN ON"* the Simplicity Elite control turns on the exhaust fan. The output is at the "EXH" terminal of the P13 connector.

When the building static pressure is 0.025" WC or more below the *"BUILDING PRESSURE SETPOINT"* the Simplicity Elite control lowers the 2 – 10 volt DC output to the exhaust damper to close the damper.

When the exhaust damper position is equal to or less than the *"EXHAUST DAMPER POSITION FOR EXHAUST FAN TO TURN OFF"* the Simplicity Elite control turns on the exhaust fan.

The minimum run time is 20 seconds and the minimum off time is 60 seconds.

Modulating Exhaust with a VFD

This exhaust option uses a Variable Frequency Drive (VFD) and a barometric damper.

The following System Parameters must be programmed through the Simplicity Elite control:

"POWER EXHAUST INSTALLED" – must be turned on using Parameter 43 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"BUILDING STATIC PRESSURE SENSOR INSTALLED" – must be turned on using Parameter 85 under the PROGRAM key on the Simplicity Elite control board or under the EQUIPMENT INSTALLATION tab in the Simplicity PC software package.

"BUILDING PRESSURE SETPOINT" must be programmed using Parameter 31 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

"EXHAUST VFD INSTALLED" must be turned on using Parameter 45 under the PROGRAM key on the Simplicity Elite control board or under the ECONOMIZER/EXHAUST tab in the Simplicity PC software package.

Sequence of Operation

When the building static pressure is 0.025" WC or more above the *"BUILDING PRESSURE SETPOINT"* the Simplicity Elite control sends a 2 to 10 volt DC signal to Exhaust Fan VFD, the output is at the "EXD+" and "EXD-" terminals at the P14 connector, and enables the VFD operation through the output at the "EXH" terminal of the P13 connector. When the exhaust fan first comes on it will operate at the "Output Frequency Low Limit" that is programmed into the Exhaust Van VFD, regardless of the voltage output from the Simplicity Elite control.

When the building static pressure is 0.025" WC or more below the *"BUILDING PRESSURE SETPOINT"* the Simplicity Elite control lowers the 2 – 10 volt DC output to the Exhaust Fan VFD. When the output is equal to or below 2 volts, the Exhaust Fan VFD enable input is removed.

PRE-OCCUPANCY PURGE

This feature allows the blower to come on and the economizer damper to open during the unoccupied period to purge the air within the conditioned space.

In order to use this feature the following parameters must be programmed:

"PRE-OCCUPANCY PURGE ENABLE" – must be enabled using the SYSTEM OPTIONS tab in the Simplicity PC software package.

"PRE-OCCUPANCY PURGE TIME (hours of day)" – must be programmed using the SYSTEM OPTIONS tab in the Simplicity PC software package.

"PRE-OCCUPANCY PURGE TIME (minutes of day)" – must be programmed using the SYSTEM OPTIONS tab in the Simplicity PC software package.

Criteria for Operation

- The feature will only work when the internal scheduling feature is being used to determine occupied and unoccupied periods.
- The feature will only work on a day that has a occupied period scheduled.

Sequence of Operation

- The programmed *"PRE-OCCUPANCY PURGE TIME"* is length of the pre-purge prior to the start of the occupancy period. For example if the *"PRE-OCCUPANCY PURGE TIME (hours of day)"* is set for 1, the *"PRE-OCCUPANCY PURGE TIME (minutes of day)"* is set to 30 and the occupancy start time is 8:00 AM pre-purge would start at 6:30 AM and operate until 8:00 AM.
- While in the pre-purge mode the Simplicity Elite control will turn on the fan and modulate the outdoor air damper to 100% as long as the supply air temperature is between 45.0° F and 90.0° F.
- If the supply air temperature drops below 45.0° F the control will modulate the outdoor air damper closed until the supply air temperature rises above 50.0° F.
- If the supply air temperature rises above 90.0° F the control will modulate the outdoor air damper closed unit the supply air temperature falls below 85.0° F.

ENERGY RECOVERY VENTILATOR

If the unit has an Energy Recovery Ventilator installed the exhaust fan needs to operate any time the supply fan is energized. This feature can be programmed to only occur in the occupied mode or in both the occupied and unoccupied mode.

The following parameters must be programmed to use this feature:

"ERV ENABLED" – must be enabled using the ECONOMIZER/EXHAUST tab of the Simplicity PC software package.

If you want this feature to operate in the unoccupied mode the following parameter must be enabled.

"ERV UNOCCUPIED FAN ENABLED"- must be enabled using the ECONOMIZER/EXHAUST tab of the Simplicity PC software package.

Sequence of Operation

In the occupied mode, anytime the supply fan is energized the exhaust fan will also be turned on.

If *"ERV UNOCCUPIED FAN ENABLED"* is enabled the exhaust fan will operate in either the occupied or unoccupied mode when the supply fan is energized.

If the unit has a Exhaust Fan VFD, the output voltage to the Exhaust Fan VFD will be the same as the voltage output to the supply fan VFD.

LOW VOLTAGE PROTECTION

The Simplicity Elite control monitors the 24 VAC low voltage level. Before the Simplicity Elite control energizes a binary output to a contactor, it checks this voltage level. If the voltage is equal to or less than 19.2 volts the control will not energize the output and will flash an Alarm Code 35. If the voltage rises above 19.2 volts the control will close the output and resume normal operation.

If the voltage drops below 16 volts with binary outputs already energized, the control will open all the binary outputs to the contactors and flash an Alarm Code 35. If the voltage rises above 19.2 volts the Simplicity Elite control will resume normal operation.

OUTDOOR AIR HEATING LOCKOUT

This feature prevents the Simplicity Elite control from operating in the heating mode when the outdoor temperature is above this set point.

The set point for this feature is programmed through the following parameter:

"OUTDOOR AIR TEMP HEATING LOCKOUT" – is programmed using the HEATING SETUP tab in the Simplicity PC software package.

HOT GAS BYPASS

Hot gas by pass is used to inject discharge gas into the expansion valve distributor to artificially place a load on the evaporator coil under a light load condition. This is done to raise the suction pressure to keep the saturation temperature of the refrigerant high enough to prevent icing of the coil. An auxiliary contact on the condenser fan, 7M- contactor, energizes the hot gas bypass valve whenever the contactor is energized. The hot gas valve monitors the suction pressure and will modulate to keep the suction pressure above 55 PSIG.

All VAV units have a hot gas valve installed in the number 1 compressor system. Hot gas is optional on CV units. If the lead/lag option is enabled the Simplicity Elite control needs to know the hot gas option is installed. This is done through the following programming parameter.

"HOT GAS BY PASS PRESENT ON COMPRESSOR # 1" - must be turned on using Parameter 79 under the PROGRAM key on the Simplicity Elite control board or under the COOLING SETUP tab of the Simplicity PC software.

SPACE TEMPERATURE ALARM

When this feature is enabled, the Simplicity Elite control monitors the space temperature. When the space temperature continues to trend above or below the programmed set point and the programmed time has expired, the Simplicity Elite control will declare a Space Temperature Alarm.

The following parameters must be programmed:

"SPACE TEMP TRENDING ALARM TEMP"- must be programmed under SYSTEM OPTIONS tab of the Simplicity PC software package.

"SPACE TEMP TRENDING ALARM TIME"- must be programmed under SYSTEM OPTIONS tab of the Simplicity PC software package.

Sequence of Operation

- To enable this feature *"SPACE TEMP TRENDING ALARM TEMP"* must be set at other then zero.
- Set *"SPACE TEMP TRENDING ALARM TEMP"* to the number of degrees above or below the space temperature that you want temperature trending to begin. The range is 1.0° F to 25.0° F in 1.0° F increments.
- To enable this feature *"SPACE TEMP TRENDING ALARM TIME"* must be set at other then zero.
- Set "*SPACE TEMP TRENDING ALARM TIME"* to the amount of time the space temperature must be trending above or below the *"SPACE TEMP TRENDING ALARM TEMP"* before a Space Temperature Alarm will be initiated. The range is 1 to 120 minutes in 1 minute increments.
- The unit must have been in a given operating mode for 10 minutes before trending will begin.
- Every time the trend moves towards the space temperature set point the *"SPACE TEMP TRENDING ALARM TIME"* will reset to zero
- When the temperature is above or below the *"SPACE TEMP TRENDING ALARM TEMP"* and the trend continues to be away from the space temperature and the *"SPACE TEMP TRENDING ALARM TIME"* has expired, the Simplicity Elite control will declare a *"SPACE TEMPERATURE"* Alarm. The Simplicity Elite control will flash an Alarm Code 41.
- The Simplicity Elite control will continue normal operation while in this fault mode.
- The Simplicity Elite control will continue to show the fault until the space temperature is less then the *"SPACE TEMP TRENDING ALARM TEMP"*.

SAT ALARM FOR HEATING

When this feature is turned on, the Simplicity Elite control monitors the supply air temperature in the heating mode and will generate an alarm if the supply air temperature goes below the set point, and if conditions are met, modifies the amount of ventilation air to keep the supply air temperature above this set point when all the heating stages are energized. This feature can only be used on unit operating in the VAV mode.

In order to use this feature the following parameter must be programmed:

"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING" – must be set under the HEATING SETUP tab of the Simplicity PC software package.

- If *"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING"* is set to zero this feature is disabled. If not set to zero, then the setting becomes the alarm set point.
- Set *"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING"* to the temperature you want to use for the Alarm set point. The range is 1.0° F to 120.0° F in 1.0° F increments.

Sequence of Operation

***"*Supply Air Temp Alarm Setpoint for Heating" Alarm**

- The control will initiate a *"SUPPLY AIR TEMP ALARM FOR HEATING"* and flash an Alarm Code 39 if the following conditions are met:
  - All the stages of heating have been on for 10 or more minutes.
  - The supply air temperature is 20 degrees below the *"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING"* set point for 10 minutes.
  - The outdoor air is not 20.0° F or more cooler then the *"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING"* set point.
  - The outdoor air damper is not open more than 20%
- In order to reset the above Alarm power to the unit must be cycled on and off.

"Economizer Minimum Position" Alarm

- The supply air temperature must be below the *"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING"* set point and the following sequence of events have occurred:
  - All the stages of heating must have been on for 10 or more minutes.
  - The outdoor air is 20.0° F or more cooler then the *"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING"* set point.
  - The economizer must be open more than 20%.
- If the above criteria is met
  - The Simplicity Elite control will close the outdoor damper for ten minutes.
  - After ten minutes, the Simplicity Elite control will read the supply air temperature.
  - If the supply air temperature is above the *"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING",* the control will keep the outdoor damper closed and complete the heating cycle.
    - The Simplicity Elite control will declare an *"ECONOMIZER MINIMUM POSITION"* Alarm and flash an Alarm Code 40.
  - If the supply air temperature is not above the *"SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING"*.
    - The Simplicity Elite control will declare a *"SUPPLY AIR TEMP ALARM FOR HEATING"* Alarm and flash an Alarm Code 39.
  - After the heating cycle is completed, the Simplicity Elite control sets the outdoor damper to its minimum position.
  - In order to reset the above alarms power to the unit must be cycled on and off.

SAT ALARM FOR COOLING

When this feature is turned, on the Simplicity Elite control monitors the supply air temperature in the cooling mode and will generate an alarm if the supply air temperature goes above the set point, and if conditions are met, modifies the amount of ventilation air to keep the supply air temperature below this set point when all the cooling stages are energized. This feature can only be used on unit operating in the VAV mode.

In order to use this feature the following parameter must be programmed:

"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING" – must be set under the COOLING SETUP tab of the Simplicity PC software package.

- If *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"* is set to zero this feature is disabled. If not set to zero, then the setting becomes the alarm set point.
- Set *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"* to the temperature you want to use for the alarm set point. The range is 1.0° F to 80.0° F in 1.0° F increments.

Sequence of Operation

"Supply Air Temp Alarm Setpoint for Cooling" Alarm

- The control will initiate a *"SUPPLY AIR TEMP ALARM FOR COOLING"* and flash an Alarm Code 38 if the following conditions are met:
  - All the stages of cooling have been on for 10 or more minutes.
  - The supply air temperature is 20 degrees above the *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"* set point for 10 minutes.
  - The outdoor air is not 20.0° F or more warmer then the *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"* set point.
  - The outdoor air damper is not open more than 20%.
- In order to reset the above alarm power to the unit must be cycled on and off.

"Economizer Minimum Position" Alarm

- The supply air temperature must be above the *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"* set point and the following sequence of events have occurred:
  - All the stages of cooling must have been on for 10 or more minutes.
  - The outdoor air is 20.0° F or more warmer then the *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"* set point.
  - The economizer must be open more than 20%.
- If the above criteria is met:
  - The Simplicity Elite control will close the outdoor damper for ten minutes.
  - After ten minutes, the Simplicity Elite control will read the supply air temperature.
  - If the supply air temperature is below the *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"*, the control will keep the outdoor damper closed and complete the cooling cycle.
  - * The Simplicity Elite control will declare an *"ECONOMIZER MINIMUM POSITION"* alarm and flash an Alarm Code 40.
  - If the supply air temperature is not below the *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"*.
    - * The Simplicity Elite control will declare a *"SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING"* alarm and flash an Alarm Code 38.
  - After the cooling cycle is completed, the Simplicity Elite control sets the outdoor damper to its minimum position.
  - In order to reset the above alarms power to the unit must be cycled on and off.

ALARM HISTORY

The last five alarms can be view on the Simplicity Elite control board as follows. The sequence below gives the alarms from the most recent to the oldest.

Alarm 1 – The most recent alarm can be viewed under Parameter 72 using the PROGRAM key on the Simplicity Elite control board.

Alarm 2 – The next alarm in sequence can be viewed under Parameter 73 using the PROGRAM key on the Simplicity Elite control board.

Alarm 3 - The next alarm in sequence can be viewed under Parameter 74 using the PROGRAM key on the Simplicity Elite control board.

Alarm 4 - The next alarm in sequence can be viewed under Parameter 75 using the PROGRAM key on the Simplicity Elite control board.

Alarm 5 - The next alarm in sequence can be viewed under Parameter 76 using the PROGRAM key on the Simplicity Elite control board.

The above alarms can also be viewed using the ALARMS tab in the Simplicity PC software program.

SECTION 6 – USER INTERFACE

There are three different methods that can be used to interface with the Simplicity Elite control:

- Program buttons and display on the Unit Controller
- Communication between the Unit Controller and a PC or Personal Computer using "Simplicity PC".
- Communication between the Unit Controller and a network

This section of the manual will explain how each of these interface method is employed.

UNIT CONTROLLER INTERFACE

Four buttons located on the control board allow for viewing and access to setpoints, alarms, functions, etc. The buttons are used in conjunction with the two numerical character displays located on the board. The character display is a convenient way to access information on the controller when a computer is not available. Three of the buttons have multiple functions. The button functions are discussed in detail below.

PROGRAM BUTTON

This button puts the board into the program mode. In the program mode, the control displays the parameter number of the two-digit display and the data for the parameter of the four-digit display.

For example, the Occupied Cooling Setpoint is parameter address 10. The addresses are listed on the Parameter Points list. Pressing the program button once places the board in program mode. The two-digit display shows address 1 and the four-digit display shows the current setting for that address. To scroll up to address 10, press the Test/Up button until address 10 appears on the two-digit display. Address 10 is the Occupied Cooling Setpoint. The factory default setting for this parameter is 72º F. To change this setpoint, address the Alarm/Change button one time. The temperature is now flashing and may be increased or decreased by pressing the Test/Up button or the Address/Down button. When the desired temperature has been selected, pressing the Alarm/Change button accepts and stores the change.

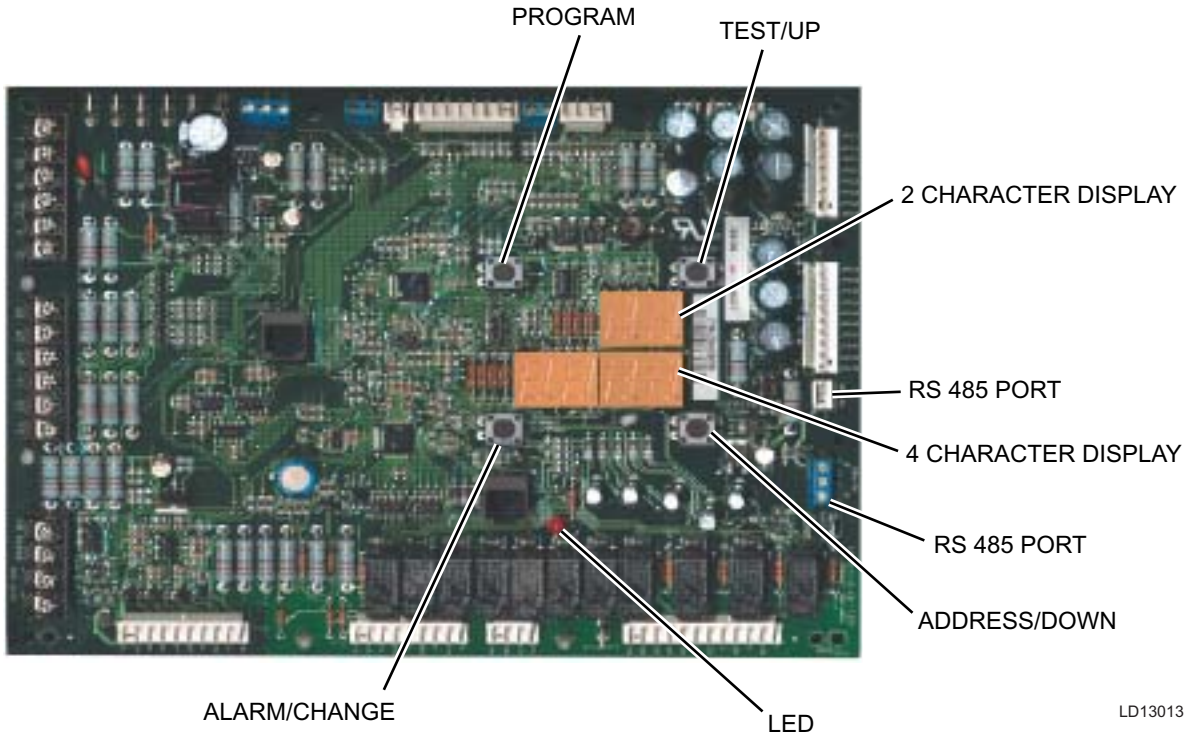

FIG. 6-1 – UNIT CONTROLLER INTERFACE

If the program button is pushed while in the program mode, the control will exit the program mode and store any changed data even if the operator failed to press the Alarm/Change button to accept any changes.

TEST/UP BUTTON

When not in the program mode, if the Test/Up button is pushed and released once within five seconds, the control skips any short cycle delays for one cycle. This is a useful aid for the technician servicing the system without having to wait for delays to time out.

If this button is pressed and released twice within five-seconds a lock-out is released. This serves the same function as temporally breaking the 24 VAC circuit to the Unit Controller.

When in the program mode this button scrolls up through the parameter addresses. *See the Parameter Points list to identify the desired parameter.* Parameters are items that can be viewed and changed in the control such as setpoints, year, date, time, time delays, etc.

ADDRESS/DOWN BUTTON

When in the program mode this button scrolls down through the parameter addresses.

This button is also used to set the controller up on a network. When wired to a network through the RS-485 terminals on the board, pushing this button once when not in the program mode causes the control to scan the communication bus. The control automatically locates the first vacant communications address and changes its address to that address. It will then display the address on the display for two seconds. The controller is then connected to the network.

When connected to a network, pressing the button twice within five-seconds causes the network address to be displayed for two seconds.

Pressing this button three times within five-seconds resets the network address to one.

ALARM/CHANGE

When this button is pressed and released one time within five-seconds, it automatically scrolls through the five alarms held in memory. The first alarm displayed is the latest and the last displayed is the oldest.

When this button is pressed and released twice within five-seconds, it clears all alarms in memory.

When in the program mode and with a parameter selected, this button when pressed once causes the data value for that parameter to begin flashing. At this point the data value can be increased or decreased using the Test/Up and Address/Down buttons. When pressed again the current data setting is accepted and stored.

CHARACTER DISPLAY ADDRESSES & CODES

Table 6-2 shows the address for each control function as well as the unit of measurement for that function, the available range of adjustment and the factory setting as the unit left the factory.

Refer to Section 7 "Parameter Descriptions and Options" for a description of each of the parameters listed in Table 6-1.

TABLE 6-1 - PARAMETER POINTS LIST

ADDRESS NUMBER	DESCRIPTION	UNITS OF ADJUSTMENT	RANGE OF ADJUSTMENT	CURRENT SETTING
1	RUN TEST	PARAMETER BIT	0 = OFF, 1 = ON	OFF
2	HEAT FAN ON DELAY	SECONDS	0-30	30
3	HEAT FAN OFF DELAY	SECONDS	0-255	60
4	COOL FAN ON DELAY	SECONDS	0-30	0
5	COOL FAN OFF DELAY	SECONDS	0-255	30
6	ADDRESS	DATA	1-250	1
7	TURN OFF CONTINUOUS FAN WHEN STARTING	PARAMETER BIT	0 = OFF, 1 = ON	OFF
8	CONSTRUCTION MODE	PARAMETER BIT	0 = OFF, 1 = ON	OFF
9	UNOCCUPIED OVERRIDE TIME PERIOD	DATA MINUTES	0-240 0 = DISABLED	60 MINUTES
10	CV OCCUPIED COOLING SETPOINT	DEGREES F	45º - 99º	72º
11	CV OCCUPIED HEATING SETPOINT	DEGREES F	45º - 99º	68º
12	CV UNOCCUPIED COOLING SETPOINT	DEGREES F	45º - 99º	85º
13	CV UNOCCUPIED HEATING SETPOINT	DEGREES F	45º - 99º	60º
14	SUPPLY AIR TEMP LIMIT FOR COOLING ENABLE	PARAMETER BIT	0 = OFF, 1 = ON	ON
15	SUPPLY AIR TEMP LIMIT COOLING SETPOINT	DEGREES F	40º - 65º	50º
16	SUPPLY AIR TEMP LIMIT FOR HEATING ENABLED	PARAMETER BIT	0 = OFF, 1 = ON	ON
17	SUPPLY AIR TEMP LIMIT HEATING SETPOINT	DEGREES F	100º - 180º	135º
18	HYDRONIC HEATING ENABLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
19	HYDRONIC HEATING STAGE #1 SUPPLY AIR SETPOINT	DEGREES F	80º - 180º	120º
20	HYDRONIC HEATING STAGE #2 SUPPLY AIR SETPOINT	DEGREES F	80º - 180º	150º
21	HYDRONIC HEAT ACTUATOR VALVE REVERSE ACTING	PARAMETER BIT	0 = OFF, 1 = ON	OFF
22	REMOTE CONTROL INPUT ENABLE FOR THIRD PARTY BAS	PARAMETER BIT	0 = OFF, 1 = ON	OFF
23	VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT	DEGREES F	40º - 70º	60º
24	VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT	DEGREES F	40º - 70º	55º
25	VAV SUPPLY AIR TEMP RESET SETPOINT	DEGREES F	40º - 85º	72º
26	VAV OCCUPIED HEATING ENABLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
27	VAV OCCUPIED HEATING SETPOINT	DEGREES F	40º - 85º	68º
28	MORNING WARM-UP ENABLE	PARAMETER BIT	0 = OFF, 1 = ON	ON
29	MORNING WARM-UP / VAV RETURN AIR TEMP SETPOINT	DEGREES F	50º - 85º	70º
30	DUCT PRESSURE SETPOINT	PRESSURE - INCHES OF H2O	0.000 - 5.000	1.500
31	BUILDING PRESSURE SETPOINT	PRESSURE - INCHES OF H2O	-.250 -.250	0.1
32	ECONOMIZER INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	ON
33	ECONOMIZER FIRST STAGE SETPOINT	DEGREES F	40º - 65º	55º
34	ECONOMIZER SECOND STAGE SETPOINT	DEGREES F	40º - 65º	50º
35	ECONOMIZER MINIMUM POSITION	PERCENT	0 - 100%	20%

Continued on next page

TABLE - 6-1 - PARAMETER POINTS LIST (CONT.)

ADDRESS NUMBER	DESCRIPTION	UNITS OF ADJUSTMENT	RANGE OF ADJUSTMENT	CURRENT SETTING
36	OUTSIDE AIR HUMIDITY SENSOR INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
37	ECONOMIZER OUTSIDE AIR ENTHALPY SETPOINT	BTUS PER POUND	10 - 50	27
38	RETURN AIR HUMIDITY SENSOR INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
39	ECONOMIZER OUTSIDE AIR TEMP ENABLE SETPOINT	DEGREES F	40º - 80º	55º
40	DEMAND VENTILATION (IAQ) ENABLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
41	IAQ SENSOR RANGE	PARTS PER MILLION	0 - 5000 PPM	2000
42	IAQ SETPOINT	PARTS PER MILLION	0 - 5000 PPM	1000
43	POWER EXHAUST INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	ON
44	MODULATING POWER EXHAUST INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
45	EXHAUST VFD INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
46	EXHAUST DAMPER POSITION FOR EXHAUST FAN TO TURN ON (MODULATING ONLY)	PERCENT OF ECONOMIZER POSITION	0 - 100%	80%
47	EXHAUST DAMPER POSITION FOR EXHAUST FAN TO TURN OFF	PERCENT OF ECONOMIZER POSITION	0 - 100%	20%
48	ECONOMIZER DAMPER POSITION FOR EXHAUST FAN TO TURN ON (NON-MODULATING ONLY)	PERCENT OF ECONOMIZER POSITION	0 - 100%	60%
49	ECONOMIZER DAMPER POSITION FOR EXHAUST FAN TO TURN OFF (MODULATING ONLY)	PERCENT OF ECONOMIZER POSITION	0 - 100%	20%
50	APS DATA	0 = CLOSED, 1 = OPEN	0 = CLOSED, 1 = OPEN	OPEN
51	DIRTY FILTER SWITCH INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
52	DIRTY FILTER SWITCH DATA	0 = CLOSED, 1 = OPEN	0 = OPEN, 1 = CLOSED	OPEN
53	COOLING MODE OPERATION ENABLE	PARAMETER BIT	0 = OFF, 1 = ON	ON
54	HEATING MODE ENABLED FOR OPERATION	PARAMETER BIT	0 = OFF, 1 = ON	ON
55	CONTINUOUS INDOOR FAN OPERATION WITH SENSOR	PARAMETER BIT	0 = OFF, 1 = ON	ON
56	SPACE TEMPERATURE OFFSET RANGE	DEGREES F	-5º F - 5º F	0º F
57	METRIC OPERATION	PARAMETER BIT	0 = OFF, 1 = ON	OFF
58	THIRD PARTY BAS ECONOMIZER ENABLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
59	YEAR	YEAR (BCD)	00 - 99	4
60	MONTH	MONTH	1 - 12	1
61	DAY OF MONTH	DAY OF MONTH	1 - 31	1
62	DAY OF WEEK	DAY OF WEEK	1 - 7	1
63	HOUR	HOURS	0 - 23	0
64	MINUTE	MINUTES	0 - 59	0
65	SUPPLY AIR TEMP	DEGREES F	-40º - 180º	0
66	RETURN AIR TEMP	DEGREES F	-40º - 180º	0
67	OUTSIDE AIR TEMP	DEGREES F	-40º - 180º	0
68	SPACE TEMP	DEGREES F	-40º - 180º	0
69	OUTSIDE AIR HUMIDITY	HUMIDITY	0% - 100%	0
70	RETURN AIR HUMIDITY	HUMIDITY	0% - 100%	0
71	OCCUPIED INPUT ENABLE	PARAMETER BIT	0 = OFF, 1 = ON	OFF

Continued on next page

TABLE - 6-1 - PARAMETER POINTS LIST (CONT.)

ADDRESS NUMBER	DESCRIPTION	UNITS OF ADJUSTMENT	RANGE OF ADJUSTMENT	CURRENT SETTING
72/73/74/ 75/76	ALARM ARRAY	DATA - 5 CHARACTERS	0 - 255	0
77	VAV / CV SELECTION	READ ONLY FLAG	CV = 0 VAV = 1	0
78	HOT GAS REHEAT	PARAMETER BIT	0 = OFF, 1 = ON	OFF
79	HOT GAS PRESENT ON COMPRESSOR # 1	PARAMETER BIT	0 = OFF, 1 = ON	OFF
80	COMPRESSORS AVAILABLE FOR COOLING	PARAMETER BIT	2 - 4	2
81	STAGES OF HEAT AVAILABLE	PARAMETER BIT	0 - 3 0 = DISABLED	2
82	DUCT STATIC READING	PRESSURE - INCHES OF H2O	0.000 - 5.000	0000
83	BUILDING STATIC PRESSURE	PRESSURE - INCHES OF H2O	0.000 - 5.000	0000
84	LOW AMBIENT KIT INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
85	BUILDING STATIC PRESSURE SENSOR INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
86	ERV INSTALLED	PARAMETER BIT	0 = OFF, 1 = ON	OFF
87	ERV UNOCCUPIED FAN ENABLE	PARAMETER BIT	0 = OFF, 1 = ON	OFF
88	DUCT STATIC SHUTDOWN SETPOINT	PRESSURE - INCHES OF H2O	0.000 - 5.000	4.500

COMMUNICATION USING SIMPLICITY PC

The recommended method to use for set up and troubleshooting is to connect the Simplicity Control to a PC or Personal Computer with "Simplicity PC" software installed. "Simplicity PC" software is available through the York UPG web site. The instructions for downloading the software are as follows:

Simplicity PC Download

1. On the internet connect to YorkUPG.Com
2. Left click on Dealers / Distributors

Johnson Controls: York Products and Services - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://YorkUPG.com
YORK
It's time to get comfortable.
To Find Your Nearest York Dealer:
Click on the button below:
Which one is for you?
Homeowners
Get comfortable with York air conditioning and heating systems for your home.
more
Dealers/ Distributors
It's time to strengthen and grow your business with York.
more
Engineers
York is your technical resource for light commercial applications.
more
Business to Business
National accounts can get single-point support here.
more
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Left click on Dealers / Distributors

LD13036

3. Left click on software

York-Heating Systems, Commercial Heating Systems, Air Conditioning Units - Microsoft Internet Explorer
http://www.yorkupg.com/dealers_distributors/index.asp
It's time to get comfortable.
Dealers/Distributors
York offers a host of great resources to help your company succeed.
Dealers/Distributors
Liberties
Advertising Support
E-Business
Seasonal Promotions
Training
Links
YorkNet
Distributor Locator
Extended Warranties
News
Safety Bulletins
Contact Us
About Us
Site Map
Talking Thermostat
Products
Residential
Light Commercial
Software
Controls
Homeowners
Engineers
Business to Business
Printable Version
More Great Reasons for You to Get Comfortable with York
York has made its mark in the HVAC industry with more the 130 years of design and innovation. Today, we take that commitment one step further with resources designed to strengthen and grow your business. From consumer promotions and Liberties™ Program to e-Biz tools and national and local advertising, York offers dealers and distributors the best resources in the industry, including:
Full Line of Residential Products
Full Line of Commercial Products
Strong Distributor Network
Distributor Advisory Council
Energy Star Partner
ASHRAE 90.1 Compliant
Extended Warranties
Good Housekeeping Seal of Approval
Dealer Uniform Program
Home Comfort Financing
Truck Identification
Outdoor Signage
Full-Color Literature
-upgnet.com-Sales Support
Business Training University (BTU)
National TV, Magazine and Yellow Pages Advertising
Consumer Toll-Free Number
Co-Op Advertising
Seasonal Promotions
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AHR EXPO
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The Leader in HVAC Design and Sales Software
CLICK HERE for Special Pricing
Elite Software
25 Years of Superior
Left click on Software

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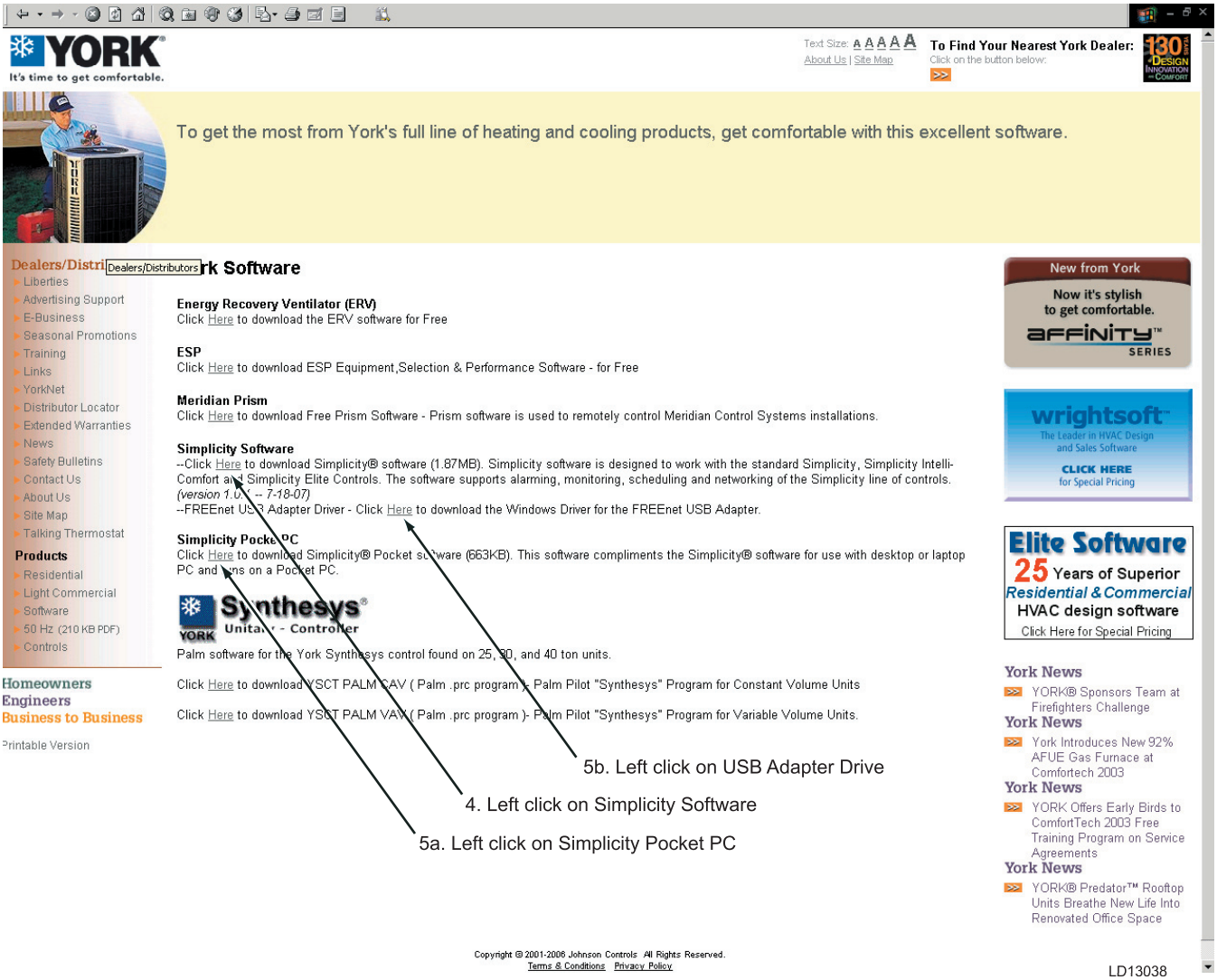
4. Left click on Simplicity Software and follow the directions for downloading the program into your computer.


YORK
It's time to get comfortable.
To Find Your Nearest York Dealer:
To get the most from York's full line of heating and cooling products, get comfortable with this excellent software.
Energy Recovery Ventilator (ERV)
Click Here to download the ERV software for Free
ESP
Click Here to download ESP Equipment,Selection & Performance Software - for Free
Meridian Prism
Click Here to download Free Prism Software - Prism software is used to remotely control Meridian Control Systems installations.
Simplicity Software
--Click Here to download Simplicity® software (1.87MB). Simplicity software is designed to work with the standard Simplicity, Simplicity Intelli-Comfort and Simplicity Elite Controls. The software supports alarming, monitoring, scheduling and networking of the Simplicity line of controls.
(version 1.0.1 -- 7-18-07)
--FREEnet USB Adapter Driver - Click Here to download the Windows Driver for the FREEnet USB Adapter.
Simplicity Pocket PC
Click Here to download Simplicity® Pocket software (663KB). This software compliments the Simplicity® software for use with desktop or laptop PC and runs on a Pocket PC.
Synthesys®
Palm software for the York Synthesys control found on 25, 30, and 40 ton units.
Click Here to download YSCT PALM CAV (Palm .prc program)- Palm Pilot "Synthesys" Program for Constant Volume Units
Click Here to download YSCT PALM VAV (Palm .prc program)- Palm Pilot "Synthesys" Program for Variable Volume Units.
5b. Left click on USB Adapter Drive
4. Left click on Simplicity Software
5a. Left click on Simplicity Pocket PC
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LD13038

USB Adapter Drive - Simplicity Pocket PC

5. Two additional programs are available for downloading. If you are running the "Simplicity PC" software on a Pocket PC you must also download Simplicity Pocket PC. Left click on Simplicity Pocket PC and follow the directions for downloading the program into your Pocket PC.

   If you are going to connect the Unit Controller to your computer through a USB port you will also have to download the USB driver. To do that left click on FREE net USB Adapter Driver and follow the directions for downloading the program into your PC.

6. In addition to the software an adapter and cable will be required to connect to the Unit Controller. The following are available through either Source 1 Parts or Baltimore Parts:

   - FREEnet Serial Adapter – Part Number 031-01966-000
   - FREEnet USB Adapter – Part Number 031-01967-000
   - Cable – Part Number 025-38682-000

7. The FREEnet USB Adapter comes with a standard USB cable. The “A” end plugs into the computer and the “B” end into the FREEnet USB Adapter.

8. The FREEnet Serial Adapter comes with a standard 9-pin Serial Extension Cable. It has a computer standard 9-pin male connector to plug into the adapter and the same style 9-pin female connector to plug into the computer. If the computer connections are the older 25-pin connector, a 25-pin female to 9-pin male cable or adapter will be needed.

   The FREEnet Serial Adapter requires two AAA batteries for power. There is an “OFF/ON” switch on the side of the adapter that needs to be turned on for operation. When not in use turn off the battery to extend its life.

9. The above cable connects between the FREEnet USB or FREEnet Serial Adapter to the Unit Controller. The following table should be used to connect the cable to each of the adapters.

FREEnet USB	
CABLE WIRE COLOR	**ADAPTER TERMINAL BOARD MARKING**
GREEN	GND
BROWN	TDA(-)
WHITE	TDB (+)

FREEnet Serial	
CABLE WIRE COLOR	**ADAPTER TERMINAL BOARD MARKING**
GREEN	GND
BROWN	TDA(-)
WHITE	TDB (+)
JUMPER	TDB(+) TO RDB(+)
JUMPER	TDA(-) TO RDA(-)

10. Connect the other end of the cable to the RS-485 P5 connector on the Unit Controller.

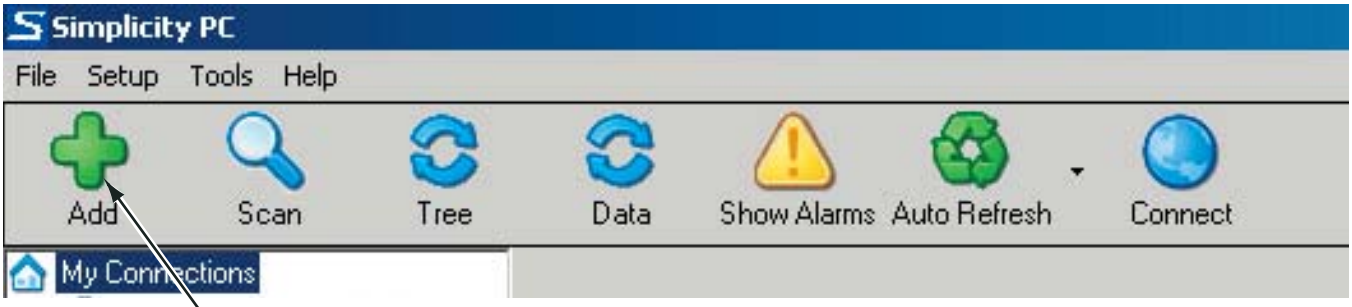
Establishing Communication

1 After installing the Simplicity PC software on the computer, the Simplicity PC icon will appear on the desktop. Double-click on the Simplicity icon to open the Simplicity window.

Double click on Simplicity PC icon

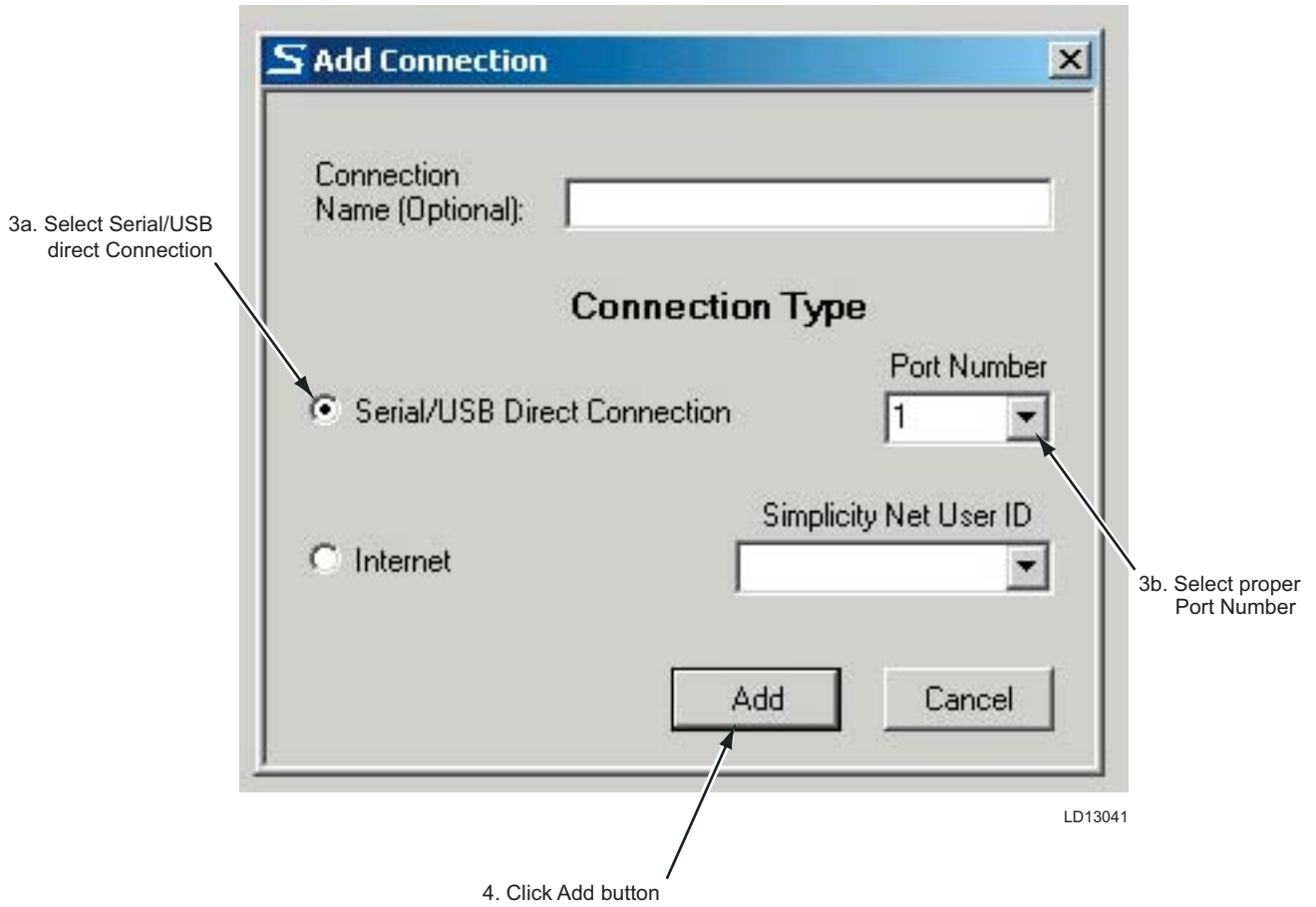
6

2. Click on the “Add” button and a dialog box will appear as shown below.



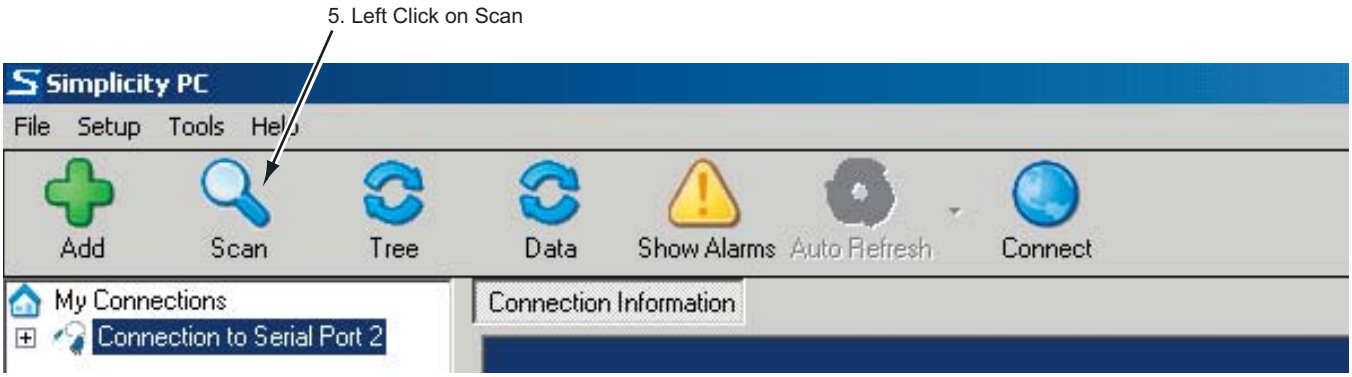
LD13040

3. In the “Connection Type” dialog box, select “Serial/USB Direct Connection”. Click on the “Port Number” pull down box and select the computer port on the computer that the network is connected to. The port number in the connection box will vary depending upon the particular computer used and what port connection it uses or has available. You can also use the “Connection Name” box to identify the unit.



LD13041

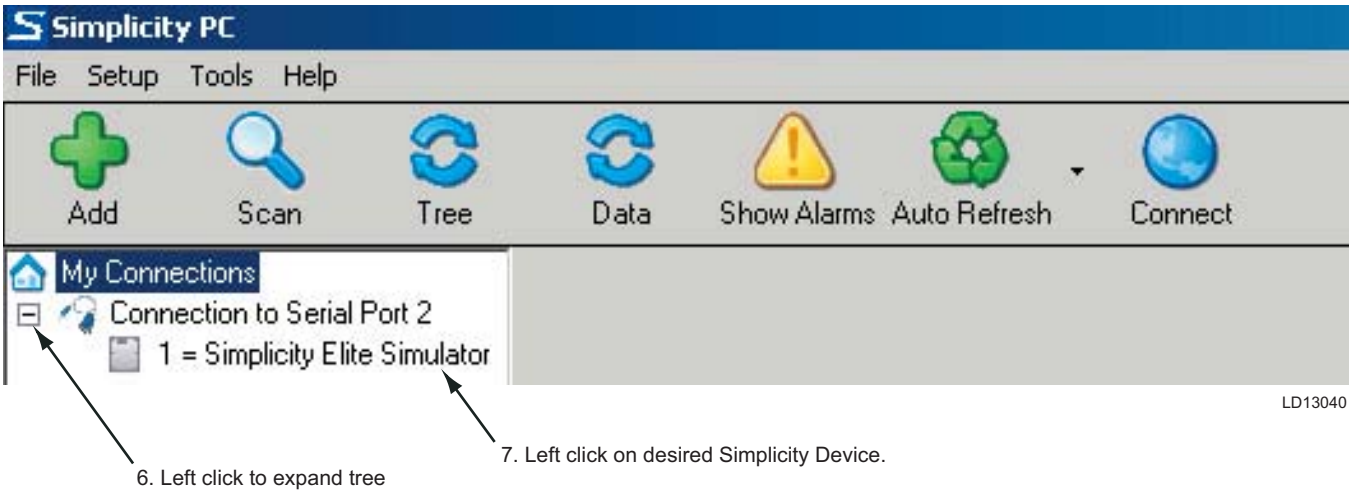
4. In the dialog box, click the "Add" button. The "Add Connection" dialog box will close and the main Simplicity window will appear. In the left pane of the main screen is a tree. Under "My Connections", the name of the device installed in the computer port connecting the computer to the simplicity network will appear. The actual name of the device will depend upon what it was named when it was set up.



LD13042

5. Click on the "Scan" button. The software will find all Simplicity devices connected to the network. The devices will appear in the tree under the name of the connection device. The names of the devices will depend upon what they were named when set up on the network.

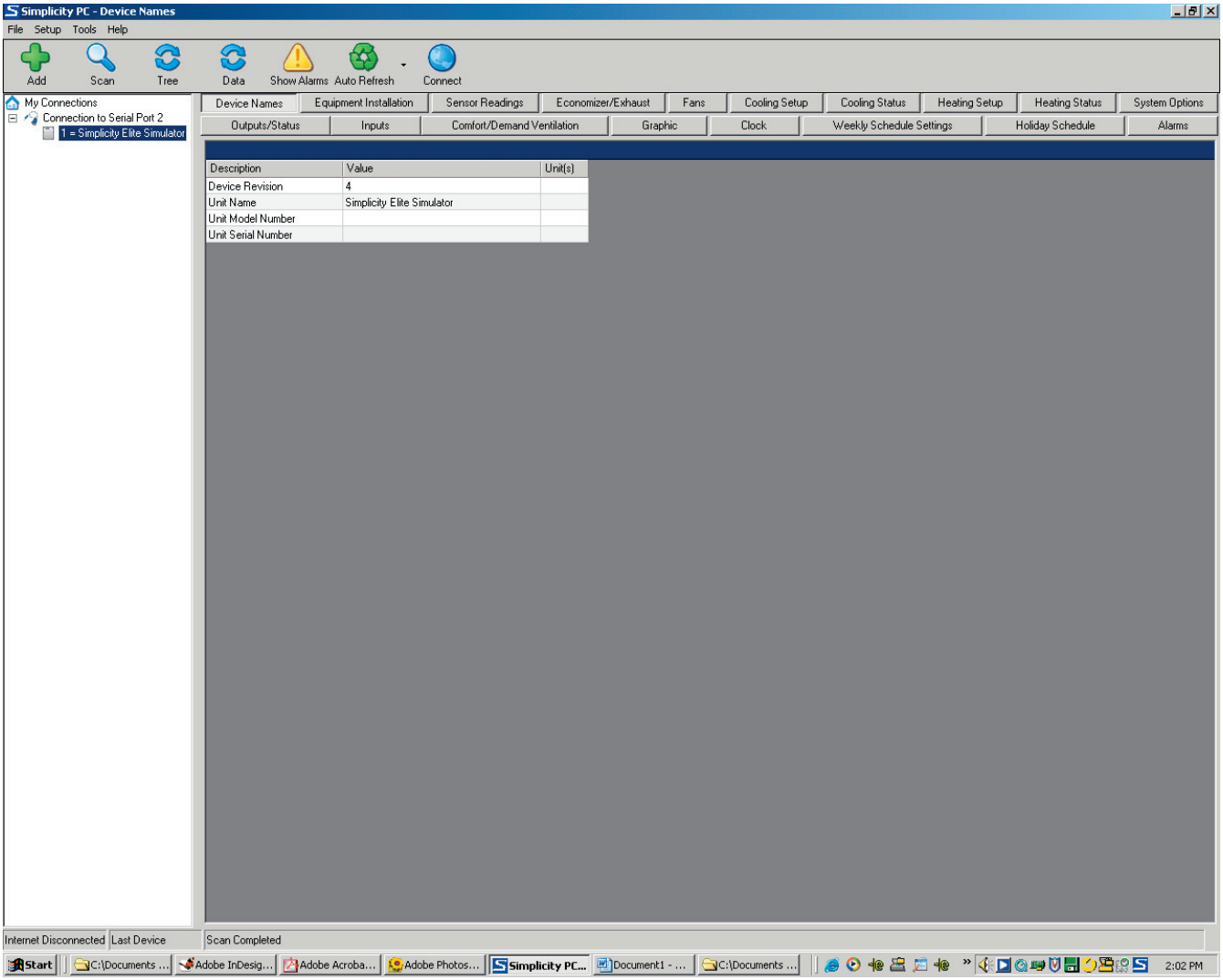
6. Move the cursor to the small box next to the left of the device name and left click. The software will find all Simplicity devices connected to the network. The devices will appear in the tree under the name of the connection device. The names of the devices will depend upon what they were named when set up on the network.



LD13040

7. Left-click on the particular Simplicity device desired.

8. The right hand side of the screen fills with a series of tabs. The tabs allow you to access, read, and change settings for that device. Click on the tab that corresponds to the information you wish to access.



LD13043

SIMPLICITY PC DATA SCREENS

The following pages identify the data contained in each of the tabs. Move the cursor to the tab and left click to open.

DEVICE NAMES

Description	Value	Unit(s)
Device Revision	4	
Unit Name	Simplicity Elite Simulator	
Unit Model Number		
Unit Serial Number		

LD13015

EQUIPMENT INSTALLATION

Description	Value	Unit(s)
Economizer Installed	ON	
Third Party BAS Economizer Enabled	OFF	
Power Exhaust Installed	ON	
Modulating Power Exhaust Installed	OFF	
Exhaust VFD Installed	ON	
Building Static Pressure Sensor Installed	ON	
Dirty Filter Switch Installed	OFF	
Outside Air Humidity Sensor Installed	OFF	
Return Air Humidity Sensor Installed	OFF	
VAV/CV Selection	ON	
VAV/CV Selection Invalid	OFF	
Space Sensor Detected	OFF	
Compressors Available for Cooling	4	
Low ambient kit Installed	OFF	
Hot Gas Bypass Present on Compressor #1	OFF	
Stages of Heating Available	2	
Hydronic Heating Installed	OFF	
Hydronic Heat Actuator Valve Reverse Acting	OFF	

LD13016

SENSOR READINGS

Description	Value	Unit(s)
Supply Air Temp	52.6	°F
Outside Air Temp	79.8	°F
Return Air Temp	69.7	°F
Space Temp	-40.0	°F
Outside Air Humidity	0	%
Outside Air Enthalpy	0	BTUs Per Pound
Return Air Humidity	0	%
Return Air Enthalpy	0	BTUs Per Pound
Building Static Pressure	0.022	Inches of WC
Duct Static Pressure	1.43	Inches of WC
Remote Control Input Value	2.10	VDC
Demand ventilation(IAQ) Value (C02)	176	PPM
Input: Dirty Filter Switch	OFF	
Input: Air Proving Switch	OFF	

LD13017

ECONOMIZER/EXHAUST

Description	Value	Unit(s)
Economizer Installed	ON	
Economizer Damper Output Status	0	% Open
Econ is Currently Using Free Cooling	OFF	
Economizer Minimum Position	20	%
Economizer Outside Air Temp Enable Setpoint	60	°F
Economizer First Stage Setpoint	55	°F
Economizer Second Stage Setpoint	50	°F
Economizer Outside Air Enthalpy Setpoint	27	BTU Per Pound
Differential Enthalpy Mode Enabled	OFF	
Economizer Loading Enabled	OFF	
Third Party BAS Economizer Enabled	OFF	
Low ambient economizer setpoint (0 disables)	0	°F
Low ambient economizer minimum position (0 disables)	0	%
Maximum IAQ economizer position	50	%
Power Exhaust Installed	ON	
Exhaust Fan Output	OFF	
Modulating Power Exhaust Installed	0	
Building Static Pressure Sensor Installed	1	
Building Pressure Setpoint	0.100	Inches of WC
Building Static Pressure	0.022	Inches of WC
Exhaust VFD Installed	1	
Exhaust Damper/VFD Output Status	0	%
Exhaust Damper Position for Exhaust Fan to Turn On	25	%
Exhaust Damper Position for Exhaust Fan to Turn Off	20	%
Economizer Damper Position for Exhaust Fan to Turn On	60	%
Economizer Damper Position for Exhaust Fan to Turn Off	20	%
ERV Enabled	0	
ERV Unoccupied Fan Enabled	0	

LD13018

FANS

Description	Value	Unit(s)
****** STATUS ******		
Indoor Fan Output	OFF	
Indoor Fan VFD Output	0	%
Condenser Fan #1 Output	OFF	
Condenser Fan #2 Output	OFF	
Exhaust Fan Output	OFF	
Fan (G) thermostat input	OFF	
Input: Indoor Fan Overload Switch	ON	
Fan ASCD Timer	0	Seconds
****** INDOOR FAN SETUP ******		
Continuous Indoor Fan Operation with Sensor (CV only)	OFF	
Turn Off Continuous Fan Operation when Starting Heat	OFF	
Indoor Fan Min Run Time	0	Seconds
Duct Pressure Setpoint	1.500	Inches of WC
Duct Pressure Shutdown Setpoint	4.500	Inches of WC
Duct Pressure Reading	1.43	Inches of WC
Indoor Fan - During Cooling		
Cool, Fan On Delay	10	Seconds
Fan On Delay Timer for Cool	0	Seconds
Cool, Fan Off Delay	60	Seconds
Fan Off Delay Timer for Cool	0	Seconds
Indoor Fan - During Heating		
Heat, Fan On Delay	10	Seconds
Fan On Delay Timer for Heat	0	Seconds
Heat, Fan Off Delay	10	Seconds
Fan Off Delay Timer for Heat	0	Seconds

LD13019

COOLING SETUP

Description	Value	Unit(s)
****** OPTIONS ******		
Cooling Mode Operation Enabled	ON	
Compressors Available for Cooling	4	
Min Run Time for Compressors	3	Minutes
Lead-Lag/Equalize Compressor Run Time Enabled	OFF	
Low ambient kit Installed	OFF	
Hot Gas Bypass Present on Compressor #1	OFF	
Cooling Fan On Delay	10	Seconds
Cooling Fan Off Delay	60	Seconds
****** CV ONLY SETPOINTS ******		
CV Occupied Cooling Setpoint	88	°F
CV UnOccupied Cooling Setpoint	92	°F
CV Current Operating Cooling Setpoint	92	°F
Temperature/Humidity (Return) Control Enabled	OFF	
Temperature/Humidity Setpoint	60	% humidity
Maximum Temperature / Humidity Setpoint Offset	3	°F
Temperature/Humidity Value per Degree Offset	5	% humidity
****** VAV ONLY SETPOINTS ******		
VAV Cooling Supply Air Temp Upper Setpoint	60	°F
VAV Cooling Supply Air Temp Lower Setpoint	55	°F
VAV Supply Air Temp Reset Setpoint	72	°F
Remote Control Input Enabled for Third Party BAS	OFF	
****** FREE COOLING ******		
Economizer Outside Air Temp Enable Setpoint	60	°F
Economizer First Stage Setpoint	55	°F
Economizer Second Stage Setpoint	50	°F
Economizer Outside Air Enthalpy Setpoint	27	BTU Per Pound
Differential Enthalpy Mode Enabled	OFF	
****** COOLING LIMITS ******		
Outdoor Air Temp Cooling Lockout	45	°F
Supply Air Temp Alarm Setpoint for Cooling	0	°F
Supply Air Temp Limit for Cooling Enabled (CV ONLY)	OFF	
Supply Air Temp Limit Cooling Setpoint (CV ONLY)	50	°F
Economizer Loading Enabled	OFF	
****** COMFORT VENTILATION ******		
Comfort Ventilation for Cooling Enabled	OFF	
Comfort Ventilation Upper Setpoint	80	°F
Comfort Ventilation Lower Setpoint	70	°F

LD13020

COOLING STATUS

Description	Value	Unit(s)
****** COMPRESSORS ******		
Status: Compressors off - Econ is using Free Cooling	OFF	
Status: Compressors off - Low Ambient Temperature	OFF	
Status: Compressors off - Low Supply Voltage	OFF	
Compressor #1 Output:	OFF	
Comp 1 ASCD Active	OFF	
Comp 1 ASCD Timer	0	Seconds
Comp 1 Min Run Timer	0	Seconds
Compressor #2 OUtput:	OFF	
Comp 2 ASCD Active	OFF	
Comp 2 ASCD Timer	0	Seconds
Comp 2 Min Run Timer	0	Seconds
Compressor #3 Output:	OFF	
Comp 3 ASCD Active	OFF	
Comp 3 ASCD Timer	0	Seconds
Comp 3 Min Run Timer	0	Seconds
Compressor #4 Output:	OFF	
Comp 4 ASCD Active	OFF	
Comp 4 ASCD Timer	0	Seconds
Comp 4 Min Run Timer	0	Seconds
****** SAFETY STATUS ******		
HPS1	ON	
HPS2	ON	
HPS3	ON	
HPS4	ON	
LPS1	ON	
LPS2	ON	
LPS3	ON	
LPS4	ON	
Comp1 Overload Switch	ON	
Comp2 Overload Switch	ON	
Comp3 Overload Switch	ON	
Comp4 Overload Switch	ON	
****** ECONOMIZER ******		
Econ is Using Free Cooling	OFF	
Control in Comfort Ventilation	OFF	
Fan On Delay Timer for Cool	0	Seconds
Fan Off Delay Timer for Cool	0	Seconds

LD13021

HEATING SETUP

Description	Value	Unit(s)
****** OPTIONS ******		
Heating Mode Enabled for Operation	ON	
Stages of Heating Available	2	
Turn Off Continuous Fan Operation when Starting Heat	OFF	
Heat, Fan On Delay	10	Seconds
Heat, Fan Off Delay	10	Seconds
****** CV SETTINGS ******		
CV Occupied Heating Setpoint	45	
CV UnOccupied Heating Setpoint	45	
CV Current Operating Heating Setpoint	45	°F
****** VAV SETTINGS ******		
VAV Occupied Heating Enabled	OFF	
VAV Occupied Heating Setpoint	68	°F
Morning Warm-Up Enabled	OFF	
Morning Warm-Up/VAV Return Air Temp Setpoint	70	°F
****** HYDRONIC HEATING ******		
Hydronic Heating Enabled	OFF	
Hydronic Heat Actuator Valve Reverse Acting	OFF	
Hydronic Heating Stage #1 Supply Air Setpoint	120	°F
Hydronic Heating Stage #2 Supply Air Setpoint	150	°F
****** HEATING LIMITS ******		
Supply Air Temp Limit for Heating Enabled	OFF	
Supply Air Temp Limit Heating Setpoint	135	°F
Supply Air Temp Alarm Setpoint for Heating	0	°F
Outdoor Air Temp Heating Lockout	75	°F
****** COMFORT VENTILATION ******		
Comfort Ventilation for Heating Enabled	OFF	
Comfort Ventilation Upper Setpoint	80	°F
Comfort Ventilation Lower Setpoint	70	°F

LD13022

6

HEATING STATUS

Description	Value	Unit(s)
Hot Water Valve Output Status	0	%
Hot Water Valve Output Status (Reverse acting)	100	%
Heating Output #1 (H1)	OFF	
Gas Valve #1	OFF	
Heat 1 ASCD Timer	0	Seconds
Heat 1 Min Run Timer	0	Seconds
Limit Switch #1	ON	
Heating Output #2 (H2)	OFF	
Gas Valve #2	OFF	
Heat 2 ASCD	0	Seconds
Heat 2 Min Run Time	0	Seconds
Limit Switch #2	ON	
Heating Output #3 (H3)	OFF	
Gas Valve #3	OFF	
Heat 3 ASCD	0	Seconds
Heat 3 Min Run Time	0	Seconds
Limit Switch #3	ON	
Freeze Thermostat Switch	ON	
Fan On Delay Timer for Heat	0	Seconds
Fan Off Delay Timer for Heat	0	Seconds

LD13023

SYSTEM OPTIONS

Description	Value	Unit(s)
Intelli-start Operation Enabled	OFF	
Morning Warm-Up Enabled	OFF	
Morning Warm-Up/VAV Return Air Temp Setpoint	70	°F
Pre-occupancy Purge Enabled	OFF	
Pre-occupancy Purge Time (Hour of Day)	0	Hours
Pre-occupancy Purge Time (Minutes of Day)	0	Minutes
Space Temperature Sensor Offset range	3	°F
Sensor: Space Temperature Sensor Offset	0	°F
Continous Fan Operations with Space Sensor (CV Mode)	OFF	
Turn Off Continuous Fan Operation when Starting Heat	OFF	
Space Sensor Fault override enabled (Construction Mode)	1	
Space Temp Trending Alarm Temp (0 disables)	0	%
Space Temp Trending Alarm Time (0 disables)	0	Minutes
Occupied Input Enabled	ON	
Network Occupied Flag	OFF	
Unoccupied Override Time	60	Minutes
Meter of Unoccupied Override Enabled	OFF	
Accumulated Unoccupied Override Time	0	Hours
Remote Control Input Enabled for Third Party BAS (VAV Only)	OFF	
Current Bus Address	1	
Requested Address Change (Bus Address)	1	
Redline	OFF	
LoadShed	OFF	

LD13024

OUTPUTS/STATUS

Description	Value	Unit(s)
****** OUTPUTS ******		
Indoor Fan	OFF	
Indoor Fan VFD Output	0	%
Exhaust Fan Enabled	OFF	
Condenser Fan #1	OFF	
Condenser Fan #2	OFF	
Compressor #1 Output:	OFF	
Compressor #2 Output:	OFF	
Compressor #3 Output:	OFF	
Compressor #4 Output:	OFF	
Hot Water Valve Output Status	0	%
Hot Water Valve Output Status (If Reverse acting)	100	%
Heating Output #1	OFF	
Heating Output #2	OFF	
Heating Output #3	OFF	
Economizer Damper Output Status	0	% Open
Exhaust Damper Output Status	0	% Open
****** MISC ******		
Active Alarm	0	
Space Sensor Detected	OFF	
Low AC Supply Voltage Detected	OFF	
Accumulated Unoccupied Override Time	0	Hours
Heating #1 Accumulated Runtime	44	Hours
Heating #2 Accumulated Runtime	18	Hours
Heating #3 Accumulated Runtime	13	Hours
Compressor #1 Accumulated Runtime	221	Hours
Compressor #2 Accumulated Runtime	154	Hours
Compressor #3 Accumulated Runtime	128	Hours
Compressor #4 Accumulated Runtime	120	Hours

LD13025

INPUTS

Description	Value	Unit(s)
Cool 1 (Y1)	OFF	
Cool 2 (Y2)	OFF	
Cool 3 (Y3)	OFF	
Cool 4 (Y4)	OFF	
Heat 1 (W1)	OFF	
Heat 2 (W2)	OFF	
Heat 3 (W3)	OFF	
Indoor Fan (G)	OFF	
Purge Switch	OFF	
OCC Input	OFF	
Network Occupied Flag	OFF	
Space Sensor Detected by control	0	

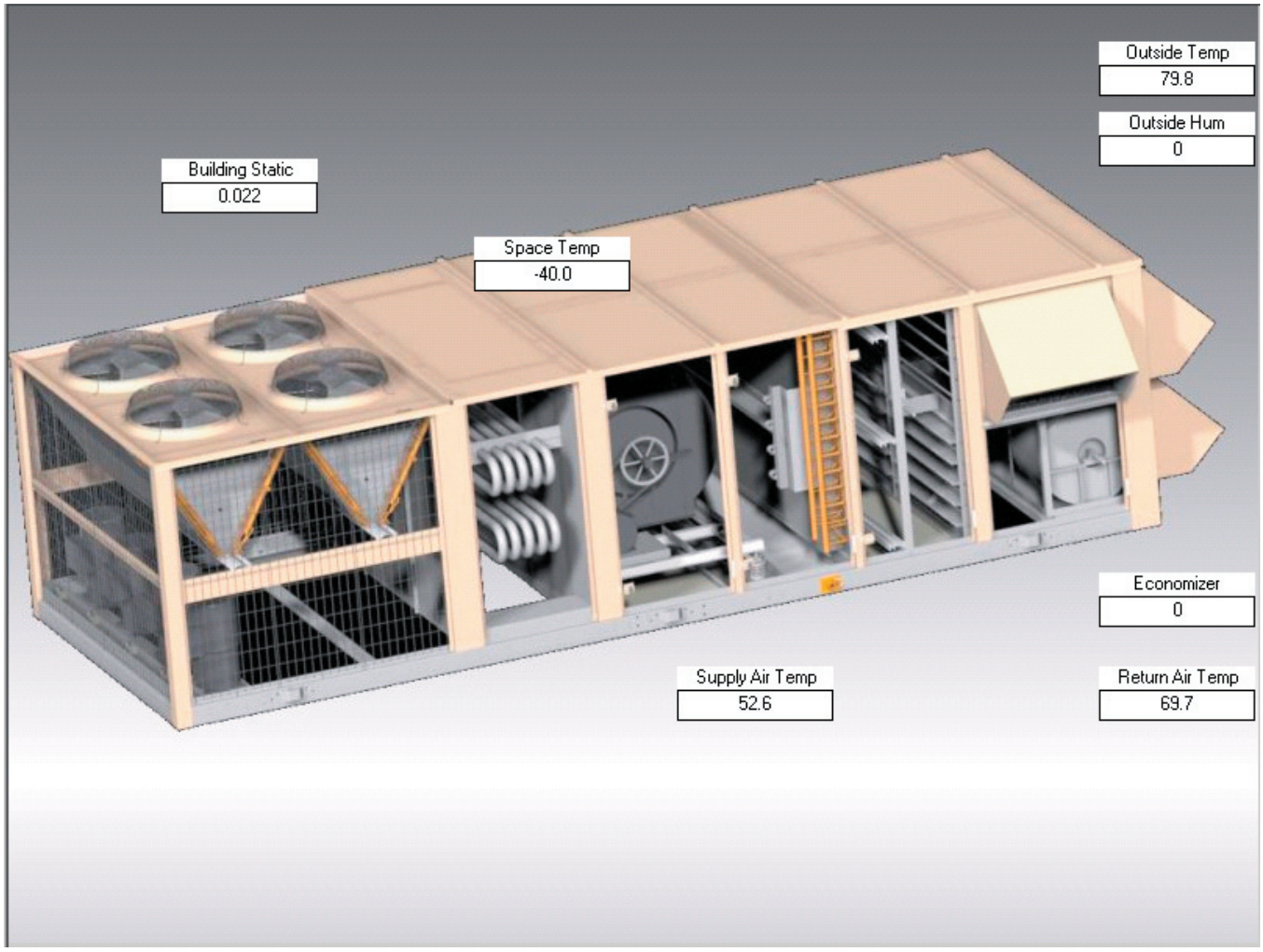
LD13014

COMFORT/DEMAND VENTILATION

Description	Value	Unit(s)
****** COMFORT VENTILATION SETUP ******		
Control in Comfort Ventilation mode	OFF	
Comfort Ventilation for Heating Enabled	OFF	
Comfort Ventilation for Cooling Enabled	OFF	
Comfort Ventilation Upper Setpoint	80	°F
Comfort Ventilation Lower Setpoint	70	°F
****** DEMAND VENTILATION SETUP ******		
Demand Ventilation (IAQ) Enabled	OFF	
IAQ Sensor Range	5000	PPM
IAQ Setpoint	1000	PPM
Maximum IAQ economizer position	50	%
****** STATUS ******		
Supply Air Temp	52.6	°F
Outside Air Temp	79.8	°F
Economizer Damper Output Status	0	% Open
Demand ventilation(IAQ) Value (C02)	176	PPM

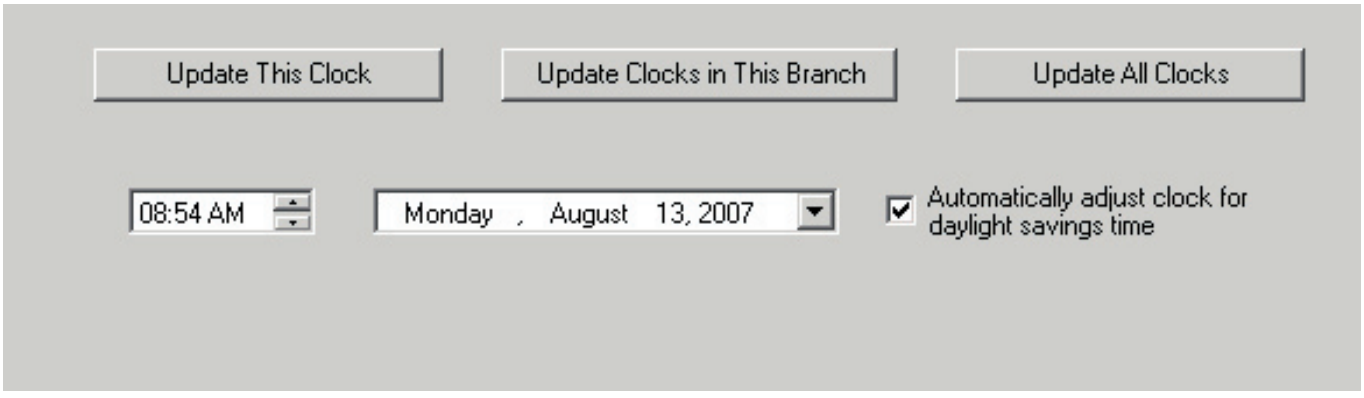
LD13026

GRAPHIC



LD13027

CLOCK

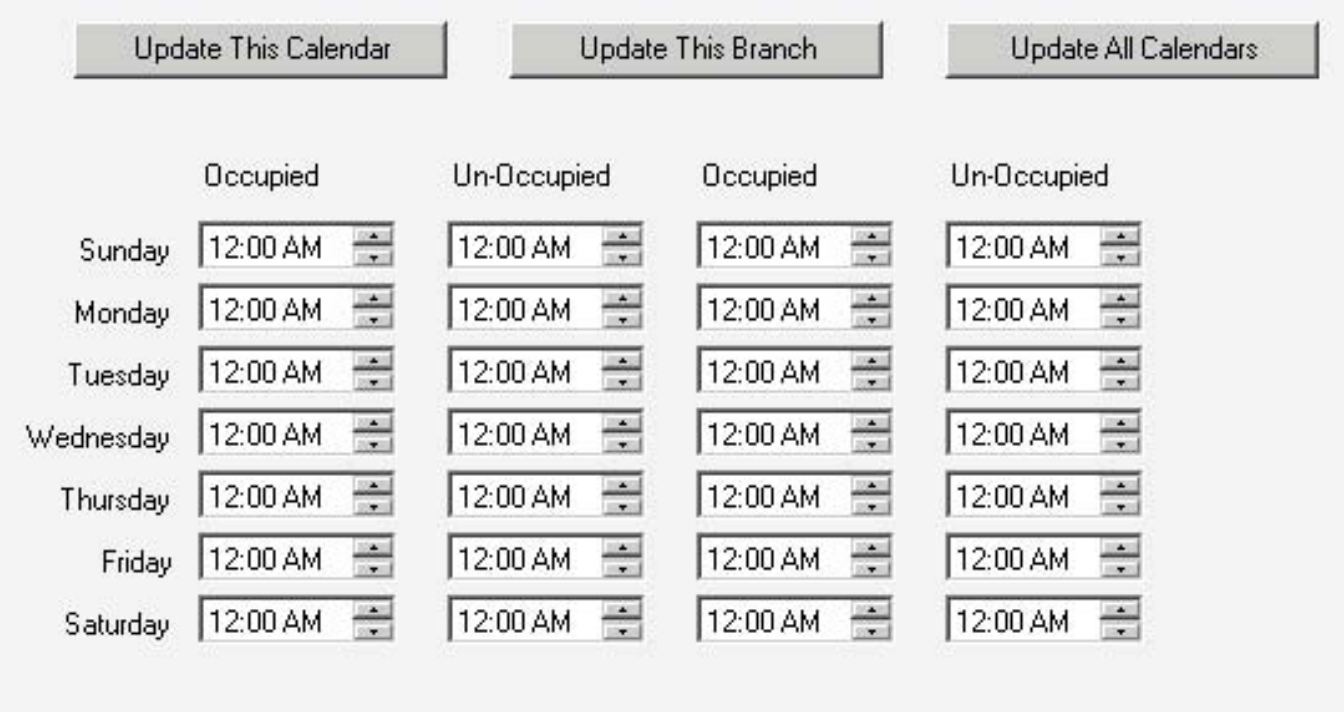

Update This Clock
Update Clocks in This Branch
Update All Clocks
08:54 AM
Monday , August 13, 2007
Automatically adjust clock for daylight savings time

LD13028

Weekly Schedule

The weekly schedule can only be programmed using the Simplicity PC software under the WEEKLY SCHEDULE SETTINGS tab. The weekly schedule has two Occupied/Unoccupied times for each of the seven days. When both the Occupied and Unoccupied times are programmed to 12:00 AM, that period is disabled. If all the times are programmed to 12:00 AM, the unit will operate 24 hours a day, 7 days a week.

WEEKLY SCHEDULE SETTINGS



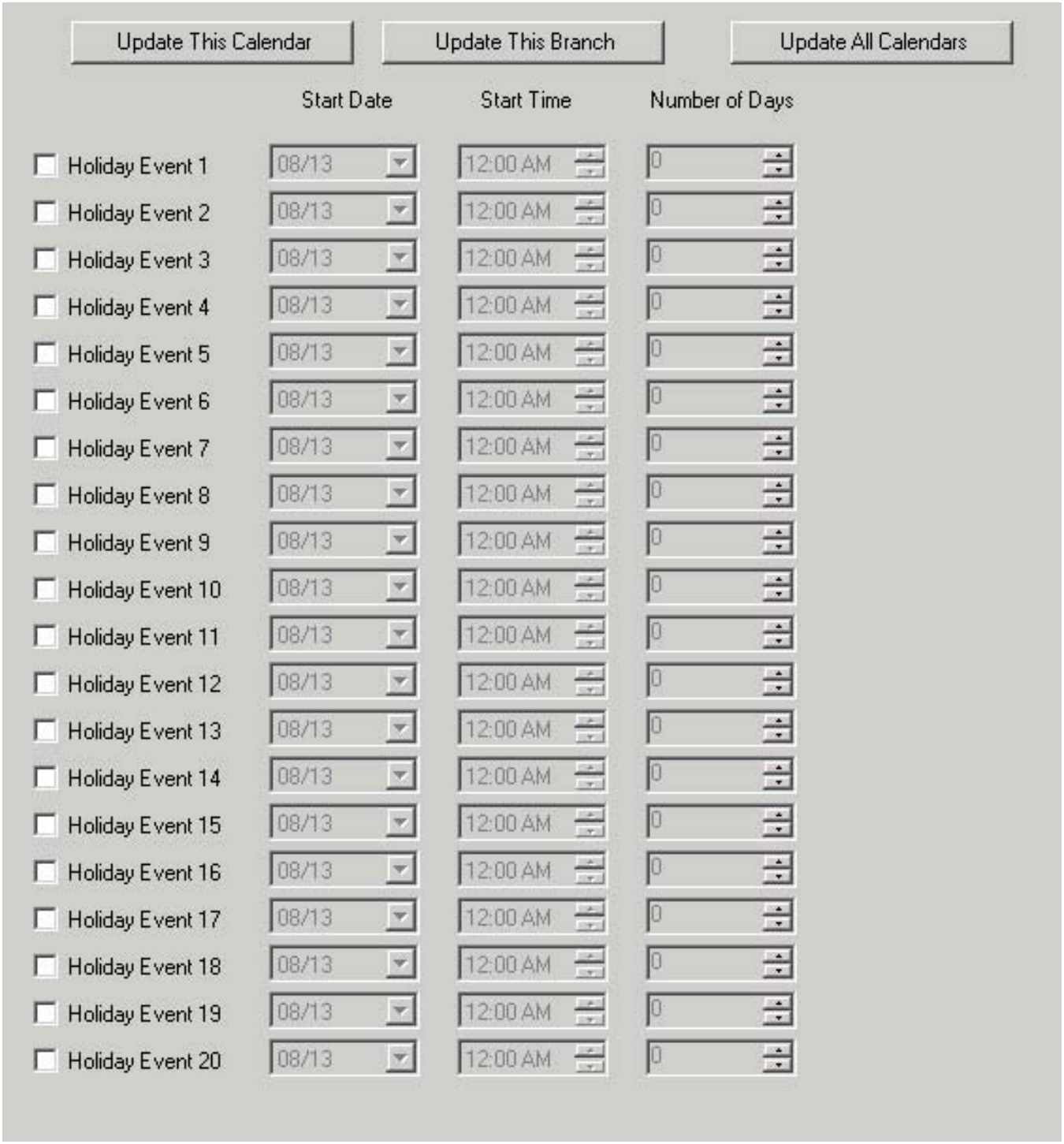
LD13029

6

Holiday Schedule

The holiday schedule can only be programmed using the Simplicity PC software under the HOLIDAY SCHEDULE tab. There are 20 holiday schedules. To program a holiday schedule left click on the box next to the holiday event you want to program. Click on the down arrow key to set the start date, the current month and year calendar will appear. Use the cursor to select the year, month, and day you want the holiday schedule to start. Use the up and down arrow key to select the time you want the holiday schedule to start. Finally select the number of days you want the holiday schedule to be active.

HOLIDAY SCHEDULE



ALARMS

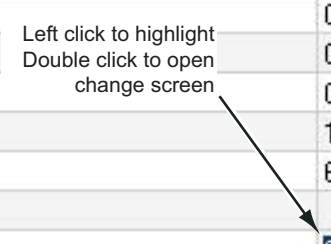
Description	Value	Unit(s)
Active Alarm	0 - No Alarm.	
Last Alarm #1	24 - The Unit is locked out due to the APS.	
Last Alarm #2	28 - the control is locked out due to Fan Overload Trips.	
Last Alarm #3	33 - the Space Setpoint Offset is greater than 20,000 ohms	
Last Alarm #4	19 - The Space Temperature Sensor has failed open or shorted.	
Last Alarm #5	25 - The APS is stuck closed.	

LD13031

REVISING SETTINGS

To change a set point move the curser to the value you want to change and left click and highlight the item.

Description	Value	Unit(s)
****** OPTIONS ******		
Cooling Mode Operation Enabled	ON	
Compressors Available for Cooling	4	
Min Run Time for Compressors	3	Minutes
Lead-Lag/Equalize Compressor Run Time Enabled	OFF	
Low ambient kit Installed	OFF	
Hot Gas Bypass Present on Compressor #1	OFF	
Cooling Fan On Delay	10	Seconds
Cooling Fan Off Delay	60	Seconds
****** CV ONLY SETPOINTS ******		
CV Occupied Cooling Setpoint	88	°F
CV UnOccupied Cooling Setpoint	92	°F
CV Current Operating Cooling Setpoint	92	°F
Temperature/Humidity (Return) Control Enabled	OFF	
Temperature/Humidity Setpoint	60	% humidity
Maximum Temperature / Humidity Setpoint Offset	3	°F
Temperature/Humidity Value per Degree Offset	5	% humidity
****** VAV ONLY SETPOINTS ******		
VAV Cooling Supply Air Temp Upper Setpoint	60	°F
VAV Cooling Supply Air Temp Lower Setpoint	55	°F
VAV Supply Air Temp Reset Setpoint	72	°F
Remote Control Input Enabled for Third Party BAS	OFF	
****** FREE COOLING ******		
Economizer Outside Air Temp Enable Setpoint	60	°F
Economizer First Stage Setpoint	55	°F
Economizer Second Stage Setpoint	50	°F
Economizer Outside Air Enthalpy Setpoint	27	BTU Per Pound
Differential Enthalpy Mode Enabled	OFF	
****** COOLING LIMITS ******		
Outdoor Air Temp Cooling Lockout	45	°F
Supply Air Temp Alarm Setpoint for Cooling	0	°F
Supply Air Temp Limit for Cooling Enabled (CV ONLY)	OFF	
Supply Air Temp Limit Cooling Setpoint (CV ONLY)	50	°F
Economizer Loading Enabled	OFF	
****** COMFORT VENTILATION ******		
Comfort Ventilation for Cooling Enabled	OFF	
Comfort Ventilation Upper Setpoint	80	°F
Comfort Ventilation Lower Setpoint	70	°F

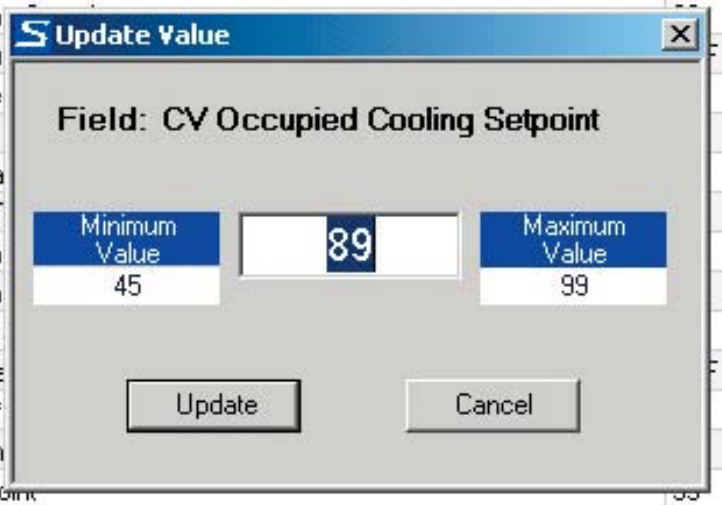


LD13032

To open the change screen double left click.

The screen will show the current value and the acceptable range. Us the numeric key pad to enter the revised setting. Left click on "Update" and the value will be change at the Unit Controller.

Description	Value	Unit(s)
****** OPTIONS ******		
Cooling Mode Operation Enabled	ON	
Compressors Available for Cooling	4	
Min Run Time for Compressors	3	Minutes
Lead-Lag/Equalize Compressor Run Time Enabled	OFF	
Low ambient kit Installed	OFF	
Hot Gas Bypass Present on Compressor #1	OFF	
Cooling Fan On Delay	10	Seconds
Cooling Fan Off Delay	60	Seconds
****** CV ONLY SETPOINTS ******		
CV Occupied Cooling Setpoint	89	°F
CV UnOccupied Cooling Setpoint	92	°F
CV Current Operating Coolin		°F
Temperature/Humidity (Retu		
Temperature/Humidity Se		% humidity
Maximum Temperature /		°F
Temperature/Humidity Va		% humidity
****** VAV ONLY SETPOINT		
VAV Cooling Supply Air Tem		°F
VAV Cooling Supply Air Tem		°F
VAV Supply Air Temp Reset		°F
Remote Control Input Enable		
****** FREE COOLING ******		
Economizer Outside Air Tem		°F
Economizer First Stage Setpoint		°F
Economizer Second Stage Setpoint	50	°F
Economizer Outside Air Enthalpy Setpoint	27	BTU Per Pound
Differential Enthalpy Mode Enabled	OFF	
****** COOLING LIMITS ******		
Outdoor Air Temp Cooling Lockout	45	°F
Supply Air Temp Alarm Setpoint for Cooling	0	°F
Supply Air Temp Limit for Cooling Enabled (CV ONLY)	OFF	
Supply Air Temp Limit Cooling Setpoint (CV ONLY)	50	°F
Economizer Loading Enabled	OFF	
****** COMFORT VENTILATION ******		
Comfort Ventilation for Cooling Enabled	OFF	
Comfort Ventilation Upper Setpoint	80	°F
Comfort Ventilation Lower Setpoint	70	°F



LD13033

6

To change a value move the curser to the value you want to change and left click and highlight the item.

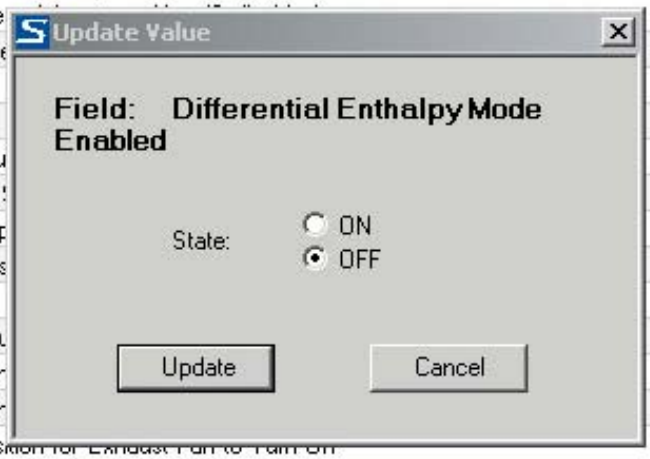
Description	Value	Unit(s)
Economizer Installed	ON	
Economizer Damper Output Status	0	% Open
Econ is Currently Using Free Cooling	OFF	
Economizer Minimum Position	20	%
Economizer Outside Air Temp Enable Setpoint	60	°F
Economizer First Stage Setpoint	55	°F
Economizer Second Stage Setpoint	50	°F
Economizer Outside Air Enthalpy Setpoint	27	BTU Per Pound
Differential Enthalpy Mode Enabled	OFF	
Economizer Loading Enabled	OFF	
Third Party BAS Economizer Enabled	OFF	
Low ambient economizer setpoint (0 disables)	0	°F
Low ambient economizer minimum position (0 disables)	0	%
Maximum IAQ economizer position	50	%
Power Exhaust Installed	ON	
Exhaust Fan Output	OFF	
Modulating Power Exhaust Installed	0	
Building Static Pressure Sensor Installed	1	
Building Pressure Setpoint	0.100	Inches of WC
Building Static Pressure	0.022	Inches of WC
Exhaust VFD Installed	1	
Exhaust Damper/VFD Output Status	0	%
Exhaust Damper Position for Exhaust Fan to Turn On	25	%
Exhaust Damper Position for Exhaust Fan to Turn Off	20	%
Economizer Damper Position for Exhaust Fan to Turn On	60	%
Economizer Damper Position for Exhaust Fan to Turn Off	20	%
ERV Enabled	0	
ERV Unoccupied Fan Enabled	0	

Left click to highlight
Double click to open
change screen

LD13034

The screen will show the current value and option. Move the curser and left click on the option you want to turn on. Left click on "Update" and the value will be change at the Unit Controller.

Description	Value	Unit(s)
Economizer Installed	ON	
Economizer Damper Output Status	0	% Open
Econ is Currently Using Free Cooling	OFF	
Economizer Minimum Position	20	%
Economizer Outside Air Temp Enable Setpoint	60	°F
Economizer First Stage Setpoint	55	°F
Economizer Second Stage Setpoint	50	°F
Economizer Outside Air Enthalpy Setpoint	27	BTU Per Pound
Differential Enthalpy Mode Enabled	OFF	
Economizer Loading Enabled	OFF	
Third Party BAS Economizer Enabled	OFF	
Low ambient economizer setpoint (0 disables)	0	°F
Low ambient economize	0	%
Maximum IAQ economize	50	%
Power Exhaust Installed	ON	
Exhaust Fan Output	OFF	
Modulating Power Exhau	0	
Building Static Pressure	1	
Building Pressure Setp	0.100	Inches of WC
Building Static Press	0.022	Inches of WC
Exhaust VFD Installed	1	
Exhaust Damper/VFD Ou	0	%
Exhaust Damper Position	25	%
Exhaust Damper Position	20	%
Economizer Damper Position for Exhaust Fan to Turn On	60	%
Economizer Damper Position for Exhaust Fan to Turn Off	20	%
ERV Enabled	0	
ERV Unoccupied Fan Enabled	0	



LD13035

6

TABLE 6-2 - SIMPLICITY ELITE DATA MAP

Writing to any register not in this list may cause erratic operation

This product is not designed to accept continuous writes to data stored in long term memory. It is recommended that no stored value be changed more often than an average of once per hour. Changing data more often risks damaging the ability of the control to store new data for the full life of the product.

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
00 H	0 H	NA	20	NA	NA	DEVICE ID = 20 FOR ELITE
00 L	0 L	NA	-	0	255	DEVICE SOFTWARE REVISION
01 H	1 H	NA	54	-	-	OPTION BYTE #1
		0				BITS 1 AND 0 = 0,0 RESPECTIVELY THERE ARE 0 STAGES OF HEAT; 0,1 = 1 STAGE; 1,0 = 2 STAGES; 1,1 = 3 STAGES
		1				
		2				1 = HEATING MODE ENABLED FOR OPERATION
		3				1 = TURN OFF CONTINUOUS FAN WHEN STARTING HEAT
		4				1 = COOLING MODE ENABLED FOR OPERATION
		5				1 = ECONOMIZER LOADING ACTIVE
		6				1 = SPACE SENSOR FAULT OVERRIDE ENABLED
		7				NA
01 L	1 L	NA	NA	NA	NA	ACTIVE ALARM
02 H	2 H	NA	30	0	30	FAN ON DELAY FOR HEAT (SECONDS)
02 L	2 L	NA	60	0	255	FAN OFF DELAY FOR HEAT (SECONDS)
03 H	3 H	NA	0	0	30	FAN ON DELAY FOR COOL (SECONDS)
03 L	3 L	NA	30	0	255	FAN OFF DELAY FOR COOL (SECONDS)
04 L	4 L	NA	3	1	10	MINIMUM RUN TIME FOR COMPRESSORS (MINUTES)
05 H	5 H	NA	0	0	255	HEATING #1 ACCUMULATED RUN TIME (HOURS, HIGH BYTE)
05 L	5 L	NA	0	0	255	HEATING #1 ACCUMULATED RUN TIME (HOURS, LOW BYTE)
06 H	6 H	NA	0	0	255	HEATING #2 ACCUMULATED RUN TIME (HOURS, HIGH BYTE)
06 L	6 L	NA	0	0	255	HEATING #2 ACCUMULATED RUN TIME (HOURS, LOW BYTE)
07 H	7 H	NA	0	0	255	HEATING #3 ACCUMULATED RUN TIME (HOURS, HIGH BYTE)
07 L	7 L	NA	0	0	255	HEATING #3 ACCUMULATED RUN TIME (HOURS, LOW BYTE)
08 H - 14 L	8 H - 20 L	NA				REGISTERS 8 - 20 STORE THE UNIT NAME. WHEN WRITTEN, ALL 13 REGISTERS (AT 2 BYTES PER REGISTER) SHOULD BE WRITTEN. THE FORMAT IS ASCII. CHARACTER #1 IS IN 8 H. CHARACTER #2 IS IN 8 L. CHARACTER #3 IS IN 9 H, AND SO ON.
15 H	21 H	NA	-	-	-	INPUT STATUS BYTE #1
		0				1 = Y1 ON (COOLING 1ST STAGE)
		1				1 = Y2 ON (COOLING 2ND STAGE)
		2				1 = Y3 ON (COOLING 3RD STAGE)
		3				1 = Y4 ON (COOLING 4TH STAGE)
		4				1 = W1 ON (HEATING 1ST STAGE)

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
		5				1 = W2 ON (HEATING 2ND STAGE)
		6				1 = W3 ON (HEATING 3RD STAGE)
		7				1 = G ON (INDOOR FAN)
15 L	21 L	NA	-	-	-	INPUT STATUS BYTE #2
		0				1 = HPS1 CLOSED (NOT TRIPPED)
		1				1 = HPS2 CLOSED
		2				1 = HPS3 CLOSED
		3				1 = HPS4 CLOSED
		4				1 = LPS1 CLOSED (NOT TRIPPED)
		5				1 = LPS2 CLOSED
		6				1 = LPS3 CLOSED
		7				1 = LPS4 CLOSED
16 H	22 H	NA	-	-	-	INPUT STATUS BYTE #3
		0				1 = C1 OVERLOAD CLOSED (NOT TRIPPED)
		1				1 = C2 OVERLOAD CLOSED
		2				1 = C3 OVERLOAD CLOSED
		3				1 = C4 OVERLOAD CLOSED
		4				1 = PURGE SWITCH CLOSED (ACTIVE)
		5				1 = OCC INPUT ON
		6				NA
		7				1 = DIRTY FILTER CLOSED (DIRTY CONDITION)
16 L	22 L	NA	-	-	-	INPUT STATUS BYTE #4
		0				1 = GAS VALVE #1 ON
		1				1 = GAS VALVE #2 ON
		2				1 = GAS VALVE #3 ON
		3				1 = LIMIT #1 CLOSED (NOT TRIPPED)
		4				1 = LIMIT #2 CLOSED
		5				1 = LIMIT #3 CLOSED
		6				NA
		7				NA
17 L	23 H	NA	-	-	-	INPUT STATUS BYTE #5
		0				1 = FAN OVERLOAD CLOSED (NOT TRIPPED)
		1				1 = FREEZE STAT CLOSED (NOT LOW TEMPERATURE)
		2				1 = AIR PROVING CLOSED (AIR FLOW IS SENSED)
		3				NA
		4				NA
		5				1 = VAV; 0 = CV
		6				1 = CV / VAV OUT OF RANGE (FAULT CONDITION)
		7				1 = LOW 24 VAC SUPPLY VOLTAGE
17 H	23 L	NA	-	-	-	INPUT STATUS BYTE #6
		0				1 = PROGRAM BUTTON PRESSED
		1				1 = TEST / UP BUTTON PRESSED
		2				1 = ALARMS / CHANGE BUTTON PRESSED

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
		3				1 = ADDRESS / DOWN BUTTON PRESSED
		4				NA
		5				NA
		6				NA
		7				NA
18 H	24 H	NA	-	-	-	OUTPUT STATUS BYTE #1
		0				1 = COMPRESSOR #1 ON
		1				1 = COMPRESSOR #2 ON
		2				1 = COMPRESSOR #3 ON
		3				1 = COMPRESSOR #4 ON
		4				1 = CONDENSER FAN #1 ON
		5				1 = CONDENSER FAN #2 ON
		6				1 = INDOOR FAN ON
		7				1 = EXHAUST FAN ON
18 L	24 L	NA	-	-	-	OUTPUT STATUS BYTE #2
		0				1 = STAGE 1 HEAT ON
		1				1 = STAGE 2 HEAT ON
		2				1 = STAGE 3 HEAT ON
		3				NA
		4				NA
		5				NA
		6				NA
		7				NA
19 H	25 H	NA	-	-	-	OUTPUT STATUS BYTE #3
		0				1 = COMPRESSORS OFF BECAUSE FREE COOLING IS AVAILABLE
		1				1 = COMPRESSORS OFF BECAUSE OF LOW AMBIENT
		2				1 = COMPRESSORS OFF BECAUSE SUPPLY VOLTAGE IS LOW
		3				1 = CONTROL IS IN COMFORT VENTILATION MODE
		4				1 = DISABLE CONTROL IS ACTIVE
		5				1 = ECONOMIZER IS USING FREE COOLING
		6				NA
		7				NA
19 L	25 L	NA	-	-	-	OUTPUT STATUS BYTE #4
		0				1 = COMPRESSOR #1 OFF BECAUSE OF ASCD
		1				1 = COMPRESSOR #2 OFF BECAUSE OF ASCD
		2				1 = COMPRESSOR #3 OFF BECAUSE OF ASCD
		3				1 = COMPRESSOR #4 OFF BECAUSE OF ASCD
		4				NA
		5				NA
		6				NA
		7				NA
1A H	26 H	NA	12	-	-	OPTION BYTE #2

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
		0				BITS 1 AND 0 = 0,0 RESPECTIVELY THERE ARE 2 STAGES OF COMPRESSION; 0,1 = 3 STAGES; 1,0 = 4 STAGES; 1,1 = 4 STAGES
		1				
		2				1 = SAT LIMIT FOR COOLING ENABLED
		3				1 = SAT LIMIT FOR HEATING ENABLED
		4				1 = HYDRONIC HEATING ENABLED
		5				1 = HYDRONIC HEAT ACTUATOR VALVE REVERSE ACTING
		6				1 = REMOTE CONTROL INPUT ENABLED FOR THIRD PARTY BAS
		7				1 = HOT GAS REHEAT ENABLED
1A L	26 L	NA	4	-	-	OPTION BYTE #3
		0				1 = VAV OCCUPIED HEATING ENABLED
		1				NA
		2				1 = ECONOMIZER PRESENT
		3				1 = OUTSIDE AIR HUMIDITY SENSOR PRESENT
		4				1 = RETURN AIR HUMIDITY SENSOR PRESENT
		5				1 = PRE-OCCUPANCY PURGE ENABLED
		6				1 = DEMAND VENTILATION ENABLED
		7				1 = BUILDING PRESSURE SENSOR INSTALLED
1B H	27 H	NA	193	-	-	OPTION BYTE #4
		0				1 = POWER EXHAUST PRESENT
		1				1 = MODULATING POWER EXHAUST PRESENT
		2				1 = EXHAUST VFD PRESENT
		3				1 = LOW AMBIENT KIT INSTALLED
		4				1 = DIRTY FILTER SWITCH PRESENT
		5				1 = INTELLI-START OPERATION ENABLED
		6				1 = INDOOR FAN OPERATES WITH SPACE SENSOR PRESENT [CV]
		7				1 = DAYLIGHT SAVINGS TIME ENABLED
1B L	27 L	NA	8	-	-	OPTION BYTE #5
		0				1 = RUN TEST ENABLED
		1				1 = METER OF UNOCCUPIED OVERRIDE ENABLED
		2				1 = METRIC DISPLAY ENABLED
		3				1 = USE THERMOSTAT OR COMMUNICATIONS FLAG FOR OCCUPIED SIGNAL
		4				1 = LEAD/LAG: EQUALIZE COMPRESSOR RUN TIME ENABLED
		5				1 = HOT GAS BYPASS PRESENT ON COMPRESSOR #1
		6				1 = THIRD PARTY BAS ECONOMIZER ENABLED
		7				1 = MORNING WARM-UP ENABLED
1C H	28 H	NA	0	0	255	ALARM 1 - MOST RECENT ALARM.
1C L	28 L	NA	0	0	255	ALARM 2
1D H	29 H	NA	0	0	255	ALARM 3
1D L	29 L	NA	0	0	255	ALARM 4
1E H	30 H	NA	0	0	255	ALARM 5 – OLDEST STORED ALARM.

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
1F H	31 H	NA	0	0	255	COMPRESSOR #1 ACCUMULATED RUN TIME (HOURS, HIGH BYTE)
1F L	31 L	NA	0	0	255	COMPRESSOR #1 ACCUMULATED RUN TIME (HOURS, LOW BYTE)
20 H	32 H	NA	0	0	255	COMPRESSOR #2 ACCUMULATED RUN TIME (HOURS, HIGH BYTE)
20 L	32 L	NA	0	0	255	COMPRESSOR #2 ACCUMULATED RUN TIME (HOURS, LOW BYTE)
21 H	33 H	NA	0	0	255	COMPRESSOR #3 ACCUMULATED RUN TIME (HOURS, HIGH BYTE)
21 L	33 L	NA	0	0	255	COMPRESSOR #3 ACCUMULATED RUN TIME (HOURS, LOW BYTE)
22 H	34 H	NA	0	0	255	COMPRESSOR #4 ACCUMULATED RUN TIME (HOURS, HIGH BYTE)
22 L	34 L	NA	0	0	255	COMPRESSOR #4 ACCUMULATED RUN TIME (HOURS, LOW BYTE)
24 H	36 H	NA	1	1	250	REQUESTED ADDRESS CHANGE (BUS ADDRESS)
26 L	38 L	NA	NA	NA	NA	REQUESTED OPERATION
		0				1 = REQUEST FOR 1ST STAGE COOLING
		1				1 = REQUEST FOR 2ND STAGE COOLING
		2				1 = REQUEST FOR 3RD STAGE COOLING
		3				1 = REQUEST FOR 4TH STAGE COOLING
		4				1 = REQUEST FOR 1ST STAGE HEATING
		5				1 = REQUEST FOR 2ND STAGE HEATING
		6				1 = REQUEST FOR 3RD STAGE HEATING
		7				1 = REQUEST FOR FAN
27 H - 33 L	39 H - 51 L	NA				REGISTERS 39 - 51 STORE THE MODEL NUMBER. WHEN WRITTEN, ALL 13 REGISTERS (AT 2 BYTES PER REGISTER) SHOULD BE WRITTEN. THE FORMAT IS ASCII. CHARACTER #1 IS IN 39 H. CHARACTER #2 IS IN 39 L. CHARACTER #3 IS IN 40 H, AND SO ON.
34 H - 40 L	52 H - 64 L	NA				REGISTERS 52 - 64 STORE THE SERIAL NUMBER. WHEN WRITTEN, ALL 13 REGISTERS (AT 2 BYTES PER REGISTER) SHOULD BE WRITTEN. THE FORMAT IS ASCII. CHARACTER #1 IS IN 52 H. CHARACTER #2 IS IN 52 L. CHARACTER #3 IS IN 53 H, AND SO ON.
41 L	65 L	NA	NA	NA	NA	REDLINE/LOADSHED STATUS (5 MINUTE TIMER IS STARTED EACH WRITE. VALUE IS CLEARED IF TIMER IS ALLOWED TO FINISH.)
		0				1 = SET REDLINE OPERATION
		1				1 = SET LOADSHED OPERATION
		2 - 7				BITS 2-7 UNUSED
42 L	66 L		255			CLEAR LOCKOUT STATUS
						WRITE “00” TO CLEAR ALL LOCKOUTS. ANY OTHER VALUE IS IGNORED. ALWAYS READS 255.
43 H	67 H		-	0	255	READING THIS ADDRESS RETURNS EEPROM CHECKSUM HIGH BYTE

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
43 L	67 L		-	0	255	READING THIS ADDRESS RETURNS EEPROM CHECKSUM LOW BYTE
44 H	68 H		4	0	99	REAL TIME CLOCK YEAR VALUE
44 L	68 L		1	1	12	REAL TIME CLOCK MONTH VALUE
45 H	69 H		1	1	31	REAL TIME CLOCK DAY OF MONTH VALUE
45 L	69 L		1	1	7	REAL TIME CLOCK DAY OF WEEK VALUE
46 H	70 H		0	0	23	REAL TIME CLOCK HOUR VALUE
46 L	70 L		0	0	59	REAL TIME CLOCK MINUTE VALUE
47 H	71 H		72	45	99	OCCUPIED COOLING SETPOINT [CV]
47 L	71 L		68	45	99	OCCUPIED HEATING SETPOINT [CV]
48 H	72 H		85	45	99	UN-OCCUPIED COOLING SETPOINT [CV]
48 L	72 L		60	45	99	UN-OCCUPIED HEATING SETPOINT [CV]
49 H	73 H		0	0	23	DAY 1 – OCCUPIED HOUR #1
49 L	73 L		0	0	59	DAY 1 – OCCUPIED MINUTE #1
4A H	74 H		0	0	23	DAY 1 – UN-OCCUPIED HOUR #1
4A L	74 L		0	0	59	DAY 1 – UN-OCCUPIED MINUTE #1
4B H	75 H		0	0	23	DAY 1 – OCCUPIED HOUR #2
4B L	75 L		0	0	59	DAY 1 – OCCUPIED MINUTE #2
4C H	76 H		0	0	23	DAY 1 – UN-OCCUPIED HOUR #2
4C L	76 L		0	0	59	DAY 1 – UN-OCCUPIED MINUTE #2
4D H - 50 L	77 H - 80 L		NA	NA	NA	DAY 2 (SAME FORMAT AS DAY #1)
51 H - 54 L	81 H - 84 L		NA	NA	NA	DAY 3 (SAME FORMAT AS DAY #1)
55 H - 58 L	85 H - 88 L		NA	NA	NA	DAY 4 (SAME FORMAT AS DAY #1)
59 H - 5C L	89 H - 92 L		NA	NA	NA	DAY 5 (SAME FORMAT AS DAY #1)
5D H - 60 L	93 H - 96 L		NA	NA	NA	DAY 6 (SAME FORMAT AS DAY #1)
61 H - 64 L	97 H - 100 L		NA	NA	NA	DAY 7 (SAME FORMAT AS DAY #1)
65 H	101 H		0	0	12	HOLIDAY #1 – START MONTH
65 L	101 L		0	0	31	HOLIDAY #1 – START DAY OF MONTH
66 H	102 H		0	0	23	HOLIDAY #1 – START HOUR
66 L	102 L		0	0	59	HOLIDAY #1 – START MINUTE
67 L	103 L		0	0	99	HOLIDAY #1 – NUMBER OF DAYS
68 H - 6A L	104 H - 106 L		NA	NA	NA	HOLIDAY #2 (SAME FORMAT AS HOLIDAY #1)
6B H - 6D L	107 H - 109 L		NA	NA	NA	HOLIDAY #3 (SAME FORMAT AS HOLIDAY #1)
6E H - 70 L	110 H - 112 L		NA	NA	NA	HOLIDAY #4 (SAME FORMAT AS HOLIDAY #1)

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
71 H - 73 L	113 H - 115 L		NA	NA	NA	HOLIDAY #5 (SAME FORMAT AS HOLIDAY #1)
74 H - 76L	116 H - 118 L		NA	NA	NA	HOLIDAY #6 (SAME FORMAT AS HOLIDAY #1)
77 H - 79 L	119 H - 121 L		NA	NA	NA	HOLIDAY #7 (SAME FORMAT AS HOLIDAY #1)
7A H - 7C L	122 H - 124 L		NA	NA	NA	HOLIDAY #8 (SAME FORMAT AS HOLIDAY #1)
7D H - 7F L	125 H - 127 L		NA	NA	NA	HOLIDAY #9 (SAME FORMAT AS HOLIDAY #1)
80 H - 82 L	128 H - 130 L		NA	NA	NA	HOLIDAY #10 (SAME FORMAT AS HOLIDAY #1)
83 H - 85 L	131 H - 133 L		NA	NA	NA	HOLIDAY #11 (SAME FORMAT AS HOLIDAY #1)
86 H - 88 L	134 H - 136 L		NA	NA	NA	HOLIDAY #12 (SAME FORMAT AS HOLIDAY #1)
89 H - 8B L	137 H - 139 L		NA	NA	NA	HOLIDAY #13 (SAME FORMAT AS HOLIDAY #1)
8C H - 8E L	140 H - 142 L		NA	NA	NA	HOLIDAY #14 (SAME FORMAT AS HOLIDAY #1)
8F H - 91 L	143 H - 145 L		NA	NA	NA	HOLIDAY #15 (SAME FORMAT AS HOLIDAY #1)
92 H - 94 L	146 H - 148 L		NA	NA	NA	HOLIDAY #16 (SAME FORMAT AS HOLIDAY #1)
95 H - 97 L	149 H - 151 L		NA	NA	NA	HOLIDAY #17 (SAME FORMAT AS HOLIDAY #1)
98 H - 9A L	152 H - 154 L		NA	NA	NA	HOLIDAY #18 (SAME FORMAT AS HOLIDAY #1)
9B H - 9D L	155 H - 157 L		NA	NA	NA	HOLIDAY #19 (SAME FORMAT AS HOLIDAY #1)
9E H - A0L	158 H - 160 L		NA	NA	NA	HOLIDAY #20 (SAME FORMAT AS HOLIDAY #1)
A1 H	161 H		-	0	255	SUPPLY AIR TEMPERATURE (1/10 DEGREES, HIGH BYTE, 16 BIT VALUE, 0 = -40 DEGREES F)
A1 L	161 L		-	0	255	SUPPLY AIR TEMPERATURE (1/10 DEGREES, LOW BYTE, 16 BIT VALUE, 0 = -40 DEGREES F)
A2 H	162 H		-	0	255	OUTSIDE AIR TEMPERATURE (1/10 DEGREES, HIGH BYTE, 16 BIT VALUE, 0 = -40 DEGREES F)
A2 L	162 L		-	0	255	OUTSIDE AIR TEMPERATURE (1/10 DEGREES, LOW BYTE, 16 BIT VALUE, 0 = -40 DEGREES F)
A3 H	163 H		-	0	255	RETURN AIR TEMPERATURE (1/10 DEGREES, HIGH BYTE, 16 BIT VALUE, 0 = -40 DEGREES F)
A3 L	163 L		-	0	255	RETURN AIR TEMPERATURE (1/10 DEGREES, LOW BYTE, 16 BIT VALUE, 0 = -40 DEGREES F)

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
A4 H	164 H		-	0	255	SPACE SENSOR TEMPERATURE (ROOM AIR) (1/10 DEGREES, HIGH BYTE, 16 BIT VALUE, 0 = -40 DEGREES F)
A4 L	164 L		-	0	255	SPACE SENSOR TEMPERATURE (ROOM AIR) (1/10 DEGREES, LOW BYTE, 16 BIT VALUE, 0 = -40 DEGREES F)
A5 L	165 L		3	0	5	SPACE SENSOR OFFSET RANGE (DEGREES)
A6 L	166 L		-	0	100	RETURN AIR HUMIDITY (%)
A7 L	167 L		-	0	100	OUTSIDE AIR HUMIDITY (%)
A8 H	168 H		-	0	255	DEMAND VENTILATION (IAQ) VALUE (PPM VALUE, HIGH BYTE)
A8 L	168 L		-	0	255	DEMAND VENTILATION (IAQ) VALUE (PPM VALUE, LOW BYTE)
A9 H	169 H		-	0	255	BUILDING PRESSURE VALUE (0.001” WC, HIGH BYTE, 0 = -0.250” WC, MAX = 0.250” WC)
A9 L	169 L		-	0	255	BUILDING PRESSURE VALUE (0.001” WC, LOW BYTE, 0 = -0.250” WC, MAX = 0.250” WC)
AA H	170 H		-	0	255	DUCT PRESSURE VALUE (0.01” WC, HIGH BYTE, 0 = 0.00” WC, MAX = 5.00” WC)
AA L	170 L		-	0	255	DUCT PRESSURE VALUE (0.01” WC, LOW BYTE, 0 = 0.00” WC, MAX = 5.00” WC)
AB H	171 H		0	0	200	REMOTE CONTROL INPUT VALUE (0.05 VDC COUNTS FOR COOLING SAT SETPOINT SCALING)
AB L	171 L		40	0	200	DEMAND VENTILATION SETPOINT (25 PPM INCREMENTS, MAXIMUM 5000 PPM)
AC L	172 L		80	0	200	AIR QUALITY (DV) SENSOR RANGE (25 PPM INCREMENTS, MAXIMUM 5000 PPM)
AD L	173 L		60	0	240	UNOCCUPIED OVERRIDE TIME PERIOD (MINUTES)
AE H	174 H		45	0	100	OUTDOOR AIR TEMPERATURE COOLING LOCKOUT TEMPERATURE (DEGREES F, 0 = DISABLED)
AE L	174 L		75	0	100	OUTDOOR AIR TEMPERATURE HEATING LOCKOUT TEMPERATURE (DEGREES F, 0 = DISABLED)
AF H	175 H		50	40	65	SAT COOLING LIMIT SETPOINT (DEGREES F)
AF L	175 L		135	100	180	SAT HEATING LIMIT SETPOINT (DEGREES F)
B0 H	176 H		120	80	180	HYDRONIC HEATING STAGE #1 SUPPLY AIR SETPOINT (DEGREES F)
B0 L	176 L		150	80	180	HYDRONIC HEATING STAGE #2 SUPPLY AIR SETPOINT (DEGREES F)
B1 H	177 H		80	60	85	COMFORT VENTILATION UPPER SETPOINT (DEGREES F)
B1 L	177 L		70	60	85	COMFORT VENTILATION LOWER SETPOINT (DEGREES F)
B2 H	178 H		60	40	70	VAV COOLING SUPPLY AIR TEMPERATURE: UPPER SETPOINT (DEGREES F)
B2 L	178 L		55	40	70	VAV COOLING SUPPLY AIR TEMPERATURE: LOWER SETPOINT (DEGREES F)
B3 H	179 H		72	40	85	VAV COOLING SUPPLY AIR TEMPERATURE: RESET SETPOINT (DEGREES F)
B3 L	179 L		68	40	85	VAV OCCUPIED HEATING SETPOINT (DEGREES F)

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
B4 H	180 H		70	50	85	MORNING WARM-UP AND VAV HEATING: RETURN AIR TEMPERATURE SETPOINT (DEGREES F)
B5 H	181 H		60	0	200	DUCT PRESSURE SETPOINT (0.025” WC INCREMENTS, DEFAULT = 1.500” WC « 60)
B5 L	181 L		180	0	200	DUCT PRESSURE SHUTDOWN SETPOINT (0.025” WC INCREMENTS, DEFAULT = 4.500” WC « 180)
B6 H	182 H		70	0	100	BUILDING PRESSURE SETPOINT (0.005” WC INCREMENTS, 0 = -0.250” WC, DEFAULT = 0.100” WC « 70)
B7 H	183 H		55	40	65	ECONOMIZER FIRST STAGE (UPPER) SETPOINT (DEGREES F)
B7 L	183 L		50	40	65	ECONOMIZER SECOND STAGE (LOWER) SETPOINT (DEGREES F)
B8 H	184 H		20	0	100	ECONOMIZER MINIMUM POSITION (PERCENT)
B9 H	185 H		27	10	50	ECONOMIZER OUTSIDE AIR ENTHALPY SETPOINT (BTU PER POUND)
B9 L	185 L		27	10	50	ECONOMIZER RETURN AIR ENTHALPY SETPOINT (BTU PER POUND)
BA H	186 H		55	40	80	ECONOMIZER OUTSIDE AIR TEMPERATURE ENABLE SETPOINT (DEGREES F)
BB H	187 H		4	0	23	PRE-OCCUPANCY PURGE TIME (HOURS)
BB L	187 L		0	0	59	PRE-OCCUPANCY PURGE TIME (MINUTES)
BC H	188 H		80	10	100	EXHAUST DAMPER POSITION FOR EXHAUST FAN TO TURN ON – MODULATING ONLY (PERCENT)
BC L	188 L		20	0	90	EXHAUST DAMPER POSITION FOR EXHAUST FAN TO TURN OFF – MODULATING ONLY (PERCENT)
BD H	189 H		60	10	100	ECONOMIZER DAMPER POSITION FOR EXHAUST FAN TO TURN ON – NON-MODULATING ONLY (PERCENT)
BD L	189 L		20	0	90	ECONOMIZER DAMPER POSITION FOR EXHAUST FAN TO TURN OFF – NON-MODULATING ONLY (PERCENT)
BE H	190 H		0	0	80	SUPPLY AIR TEMPERATURE ALARM SETPOINT FOR COOLING (DEGREES F, 0 = DISABLED)
BE L	190 L		0	0	120	SUPPLY AIR TEMPERATURE ALARM SETPOINT FOR HEATING (DEGREES F, 0 = DISABLED)
BF H	191 H		5	0	25	SPACE SENSOR ALARM TEMPERATURE (DEGREES F, 0 = DISABLED)
BF L	191 L		60	0	120	SPACE SENSOR ALARM TIME (MINUTES, 0 = DISABLED)
C2 H	194 H		0	0	255	INTELLI-START RECOVERY TIME (MINUTES, 0 = DISABLED)
C3 H	195 H		-	-	-	ASCD TIMER FOR COMPRESSOR #1 HIGH BYTE
C3 L	195 L		-	-	-	ASCD TIMER FOR COMPRESSOR #1 LOW BYTE. (SECONDS, COUNTS DOWN)
C4 H	196 H		-	-	-	ASCD TIMER FOR COMPRESSOR #2 HIGH BYTE
C4 L	196 L		-	-	-	ASCD TIMER FOR COMPRESSOR #2 LOW BYTE (SECONDS, COUNTS DOWN)
C5 H	197 H		-	-	-	ASCD TIMER FOR COMPRESSOR #3 HIGH BYTE
C5 L	197 L		-	-	-	ASCD TIMER FOR COMPRESSOR #3 LOW BYTE. (SECONDS, COUNTS DOWN)

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
C6 H	198 H		-	-	-	ASCD TIMER FOR COMPRESSOR #4 HIGH BYTE
C6 L	198 L		-	-	-	ASCD TIMER FOR COMPRESSOR #4 LOW BYTE (SECONDS, COUNTS DOWN)
C7 H	199 H		0	-	-	COMPRESSOR #1 MINIMUM RUN TIMER HIGH BYTE (SECONDS, COUNTS DOWN)
C7 L	199 L		0	-	-	COMPRESSOR #1 MINIMUM RUN TIMER LOW BYTE (SECONDS, COUNTS DOWN)
C8 H	200 H		0	-	-	COMPRESSOR #2 MINIMUM RUN TIMER HIGH BYTE (SECONDS, COUNTS DOWN)
C8 L	200 L		0	-	-	COMPRESSOR #2 MINIMUM RUN TIMER LOW BYTE (SECONDS, COUNTS DOWN)
C9 H	201 H		0	-	-	COMPRESSOR #3 MINIMUM RUN TIMER HIGH BYTE (SECONDS, COUNTS DOWN)
C9 L	201 L		0	-	-	COMPRESSOR #3 MINIMUM RUN TIMER LOW BYTE (SECONDS, COUNTS DOWN)
CA H	202 H		0	-	-	COMPRESSOR #4 MINIMUM RUN TIMER HIGH BYTE (SECONDS, COUNTS DOWN)
CA L	202 L		0	-	-	COMPRESSOR #4 MINIMUM RUN TIMER LOW BYTE (SECONDS, COUNTS DOWN)
CB H	203 H		-	-	-	FAN ASCD TIMER HIGH BYTE (ALWAYS ZERO)
CB L	203 L		-	-	-	FAN ASCD TIMER LOW BYTE. (SECONDS, COUNTS DOWN)
CC H	204 H		0	-	-	FAN MINIMUM RUN TIMER (SECONDS, COUNTS DOWN)
CD H	205 H		0	-	-	FAN ON DELAY TIMER FOR HEAT (SECONDS, COUNT DOWN)
CD L	205 L		0	-	-	FAN OFF DELAY TIMER FOR HEAT (SECONDS, COUNT DOWN)
CE H	206 H		0	-	-	FAN ON DELAY TIMER FOR COOL (SECONDS, COUNT DOWN)
CE L	206 L		0	-	-	FAN OFF DELAY TIMER FOR COOL (SECONDS, COUNT DOWN)
CF H	207 H		0	0	255	ACCUMULATED UNOCCUPIED OVERRIDE TIME (HOURS, HIGH BYTE)
CF L	207 L		0	0	255	ACCUMULATED UNOCCUPIED OVERRIDE TIME (HOURS, LOW BYTE)
D4 H	212 H		-	0	100	SUPPLY FAN VFD OUTPUT STATUS, 0-100% (2 – 10 VDC)
D4 L	212 L		-	0	100	EXHAUST DAMPER OUTPUT STATUS, 0-100% (2 – 10 VDC)
D5 H	213 H		-	0	100	HOT WATER VALVE OUTPUT STATUS, 0-100% (2 – 10 VDC)
D5 L	213 L		-	0	100	HOT GAS REHEAT VALVE OUTPUT STATUS, 0-100% (2 – 10 VDC)
D6 H	214 H		-	0	100	ECONOMIZER DAMPER OUTPUT STATUS, 0-100% (2 – 10 VDC)
D7 H	215 H	NA	0	-	-	OPTION BYTE #6
		0				1 = COMFORT VENTILATION FOR COOLING ENABLED
		1				1 = COMFORT VENTILATION FOR HEATING ENABLED
		2				1 = TEMPERATURE / HUMIDITY CONTROL ENABLED
		3				1 = HOT GAS REHEAT ALTERNATE OPERATION ENABLED
		4				1 = NETWORK OCCUPIED FLAG: OCC IS ON
		5				NA
		6				1 = DIFFERENTIAL ENTHALPY MODE ENABLED
		7				NA

Continued on next page

TABLE - 6-2 - SIMPLICITY ELITE DATA MAP (CONT.)

ADDRESS (HEX)	ADDRESS (DEC)	BIT	INITIAL/ DEFAULT VALUE (HEX)	MIN VALUE	MAX VALUE	DESCRIPTION
D7L	215 L	NA	0	-	-	OPTION BYTE #7
		0				1 = ERV ENABLED
		1				1 = ERV UNOCCUPIED FAN ENABLED
		2-7				NA
D8 H	216 H		S	0	100	HOT GAS REHEAT HUMIDITY SETPOINT (PERCENT HUMIDITY)
D8 L	216 L		50	20	80	TEMPERATURE / HUMIDITY SETPOINT (PERCENT HUMIDITY)
D9 H	217 H		3	0	5	MAXIMUM TEMPERATURE / HUMIDITY OFFSET (DEGREES F)
D9 L	217 L		5	1	10	TEMPERATURE / HUMIDITY VALUE THAT = 1° F OF OFFSET (PERCENT HUMIDITY)
DB H	219 H		72	45	99	OPERATING COOLING SETPOINT (DEGREES F) [CV]
DB L	219 L		68	45	99	OPERATING HEATING SETPOINT (DEGREES F) [CV]
DC H	220 H		-	10	50	OUTSIDE AIR ENTHALPY (BTUS PER POUND)
DC L	220 L		-	10	50	RETURN AIR ENTHALPY (BTUS PER POUND)
DE L	222 L		50	0	100	MAXIMUM DEMAND VENTILATION ECONOMIZER POSITION (PERCENT OPEN)
DF H	223 H		-	0	10	SPACE SENSOR OFFSET (0 = -5° F, 10 = +5° F)
E0 H	224 H		-	-	-	ASCD TIMER FOR HEATING STAGE #1 (SECONDS, COUNTS DOWN)
E0 L	224 L		-	-	-	HEATING STAGE #1 MINIMUM RUN TIMER (SECONDS, COUNTS DOWN)
E1 H	225 H		-	-	-	ASCD TIMER FOR HEATING STAGE #2 (SECONDS, COUNTS DOWN)
E1 L	225 L		-	-	-	HEATING STAGE #2 MINIMUM RUN TIMER (SECONDS, COUNTS DOWN)
E2 H	226 H		-	-	-	ASCD TIMER FOR HEATING STAGE #3 (SECONDS, COUNTS DOWN)
E2 L	226 L		-	-	-	HEATING STAGE #3 MINIMUM RUN TIMER (SECONDS, COUNTS DOWN)
E3 H	227 H		0	0	99	LOW AMBIENT ECONOMIZER MINIMUM POSITION (PERCENT)
E3 L	227 L		0	0	60	LOW AMBIENT ECONOMIZER SETPOINT (DEGREES F)

SECTION 7 – PARAMETER DESCRIPTIONS AND OPTIONS

TABLE 7-1 – DEFINITIONS

MENU ITEM	DEFINITION
ACCUMULATED UNOCCUPIED OVERRIDE TIME	THIS PARAMETER GIVES THE ACCUMULATED TIME THE UNIT HAS PLACED IN UNOCCUPIED OVERRIDE MODE.
ACTIVE ALARM	THIS IDENTIFIES THE NUMBER OF ACTIVE ALARMS PRESENT
ADDRESS	THIS PARAMETER IS USED TO SET THE COMMUNICATION ADDRESS FOR THE UNIT WHEN CONNECTED TO A NETWORK
APS DATA	THIS PARAMETER GIVES THE STATUS OF THE SUPPLY FAN AIR PROVING SWITCH. 0 = SWITCH OPEN, 1 = SWITCH CLOSED
BUILDING PRESSURE SETPOINT	THIS PARAMETER ESTABLISHES THE BUILDING PRESSURE SETPOINT FOR THE CONTROL OF BUILDING EXHAUST OPERATION
BUILDING STATIC PRESSURE	THIS PARAMETER GIVES THE CURRENT VALUE OF THE BUILDING STATIC PRESSURE INPUT
BUILDING STATIC PRESSURE SENSOR INSTALLED	THIS PARAMETER MUST BE TURNED ON TO ENABLE THE USE OF BUILDING PRESSURE IN THE OPERATION OF THE EXHAUST FUNCTION
COMFORT VENTILATION FOR COOLING ENABLED	THIS PARAMETER MUST BE TURNED ON TO ENABLED COMFORT VENTILATION DURING COOLING MODE OPERATION ON A CONSTANT VOLUME UNIT
COMFORT VENTILATION FOR HEATING ENABLED	THIS PARAMETER MUST BE TURNED ON TO ENABLE COMFORT VENTILATION DURING HEATING MODE OPERATION ON A CONSTANT VOLUME UNIT
COMFORT VENTILATION LOWER SETPOINT	THIS PARAMETER IS THE LOWER SETPOINT USED BY THE UNIT CONTROLLER TO DETERMINE WHEN TO SWITCH THE UNIT IN COMFORT VENTILATION MODE
COMFORT VENTILATION UPPER SETPOINT	THIS PARAMETER IS THE UPPER SETPOINT USED BY THE UNIT CONTROLLER TO DETERMINE WHEN TO SWITCH THE UNIT IN COMFORT VENTILATION MODE
COMP 1 ASCD ACTIVE	THIS IS USED TO DETERMINE THE STATUS OF THE OFF CYCLE TIMER. ON MEANS THE COMPRESSOR 1 IS IN THIS MODE
COMP 1 ASCD TIMER	THIS GIVES THE ACTUAL TIME OF THE OFF CYCLE TIMER FOR COMPRESSOR 1 IN SECONDS.
COMP 1 MIN RUN TIME	THIS GIVES THE ACTUAL TIME OF THE MINIMUM RUN TIME FOR COMPRESSOR 1 IN SECONDS.
COMP 1 OUTPUT	THIS GIVES THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO COMPRESSOR CIRCUIT 1
COMP 1 OVERLOAD SWITCH	THIS IS THE STATUS OF THE BINARY INPUT FROM THE COMPRESSOR OVERLOAD FOR COMPRESSOR SYSTEM 1 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
COMP 2 ASCD ACTIVE	THIS IS USED TO DETERMINE THE STATUS OF THE OFF CYCLE TIMER. ON MEANS THE COMPRESSOR 2 IS IN THIS MODE
COMP 2 ASCD TIMER	THIS GIVES THE ACTUAL TIME OF THE OFF CYCLE TIMER FOR COMPRESSOR 2 IN SECONDS.
COMP 2 MIN RUN TIME	THIS GIVES THE ACTUAL TIME OF THE MINIMUM RUN TIME FOR COMPRESSOR 2 IN SECONDS.

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TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
COMP 2 OUTPUT	THIS GIVES THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO COMPRESSOR CIRCUIT 2
COMP 2 OVERLOAD SWITCH	THIS IS THE STATUS OF THE BINARY INPUT FROM THE COMPRESSOR OVERLOAD FOR COMPRESSOR SYSTEM 2 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
COMP 3 ASCD ACTIVE	THIS IS USED TO DETERMINE THE STATUS OF THE OFF CYCLE TIMER. ON MEANS THE COMPRESSOR 3 IS IN THIS MODE
COMP 3 ASCD TIMER	THIS GIVES THE ACTUAL TIME OF THE OFF CYCLE TIMER FOR COMPRESSOR 3 IN SECONDS.
COMP 3 MIN RUN TIME	THIS GIVES THE ACTUAL TIME OF THE MINIMUM RUN TIME FOR COMPRESSOR 3 IN SECONDS.
COMP 3 OUTPUT	THIS GIVES THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO COMPRESSOR CIRCUIT 3
COMP 3 OVERLOAD SWITCH	THIS IS THE STATUS OF THE BINARY INPUT FROM THE COMPRESSOR OVERLOAD FOR COMPRESSOR SYSTEM 3 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
COMP 4 ASCD ACTIVE	THIS IS USED TO DETERMINE THE STATUS OF THE OFF CYCLE TIMER. ON MEANS THE COMPRESSOR 4 IS IN THIS MODE
COMP 4 ASCD TIMER	THIS GIVES THE ACTUAL TIME OF THE OFF CYCLE TIMER FOR COMPRESSOR 4 IN SECONDS.
COMP 4 MIN RUN TIME	THIS GIVES THE ACTUAL TIME OF THE MINIMUM RUN TIME FOR COMPRESSOR 4 IN SECONDS.
COMP 4 OUTPUT	THIS GIVES THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO COMPRESSOR CIRCUIT 4
COMP 4 OVERLOAD SWITCH	THIS IS THE STATUS OF THE BINARY INPUT FROM THE COMPRESSOR OVERLOAD FOR COMPRESSOR SYSTEM 4 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
COMPRESSOR #1 ACCUMULATED RUNTIME	THIS IS THE NUMBER OF HOURS THAT COMPRESSOR SYSTEM 1 HAS BEEN OPERATIVE
COMPRESSOR #2 ACCUMULATED RUNTIME	THIS IS THE NUMBER OF HOURS THAT COMPRESSOR SYSTEM 2 HAS BEEN OPERATIVE
COMPRESSOR #3 ACCUMULATED RUNTIME	THIS IS THE NUMBER OF HOURS THAT COMPRESSOR SYSTEM 3 HAS BEEN OPERATIVE
COMPRESSOR #4 ACCUMULATED RUNTIME	THIS IS THE NUMBER OF HOURS THAT COMPRESSOR SYSTEM 4 HAS BEEN OPERATIVE
COMPRESSORS AVAILABLE FOR COOLING	THIS PARAMETER IDENTIFIES THE NUMBERS OF COMPRESSOR THE UNIT CONTROLLER IS SET UP TO CONTROL
CONDENSER FAN #1 OUTPUT	THIS GIVES THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO THE #1 CONDENSER FAN, OFF OR ON
CONDENSER FAN #2 OUTPUT	THIS GIVES THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO THE #2 CONDENSER FAN, OFF OR ON
CONTINUOUS INDOOR FAN OPERATION WITH SENSOR	WHEN THIS PARAMETER IS TURNED ON, ON A CONSTANT VOLUME UNIT THE SUPPLY FAN WILL OPERATE WHENEVER THE UNIT IS IN THE OCCUPIED MODE
CONTROL IN COMFORT VENTILATION	THIS IDENTIFIES IF THE UNIT CONTROLLER IS IN THE COMFORT VENTILATION MODE. OFF NOT IN MODE, ON IN COMFORT VENTILATION MODE.

Continued on next page

TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
COOL FAN OFF DELAY	IN THE INTERMITTENT FAN MODE THIS IS THE TIME DELAY BETWEEN THE TIME THE COOLING CALL IS TERMINATED AND THE SHUT DOWN OF THE SUPPLY FAN
COOL FAN ON DELAY	IN THE INTERMITTENT FAN MODE THIS IS THE TIME DELAY BETWEEN THE TIME THE COOLING CALL IS INITIATED AND THE START OF THE SUPPLY FAN
COOLING MODE OPERATION ENABLE	THIS PARAMETER MUST BE TURNED ON TO ALLOW COOLING OPERATION
COOL 1 (Y1)	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL Y1 - FIRST STAGE COOLING
COOL 2 (Y2)	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL Y2 - SECOND STAGE COOLING
COOL 3 (Y3)	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL Y3 - THIRD STAGE COOLING
COOL 4 (Y4)	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL Y4 - FOURTH STAGE COOLING
CURRENT BUS ADDRESS	THIS IDENTIFIES THE ADDRESS OF THE UNIT ON THE NETWORK
CV CURRENT OPERATING COOLING SETPOINT	THIS PARAMETER IDENTIFIES THE COOLING SET POINT THE UNIT CONTROLLER IS CONTROLLING TO COOLING TOO
CV CURRENT OPERATING HEATING SETPOINT	THIS PARAMETER IDENTIFIES THE HEATING SET POINT THE UNIT CONTROLLER IS CONTROLLING TO HEATING TOO
CV OCCUPIED COOLING SET POINT	THIS IS THE SPACE OR RETURN AIR TEMPERATURE THE UNIT WILL CONTROL TO WHEN IN THE OCCUPIED COOLING MODE.
CV OCCUPIED HEATING SET POINT	THIS IS THE SPACE OR RETURN AIR TEMPERATURE THE UNIT WILL CONTROL TO WHEN IN THE OCCUPIED HEATING MODE.
CV UNOCCUPIED COOLING SET POINT	THIS IS THE SPACE OR RETURN AIR TEMPERATURE THE UNIT WILL CONTROL TO WHEN IN THE UNOCCUPIED COOLING MODE.
CV UNOCCUPIED HEATING SET POINT	THIS IS THE SPACE OR RETURN AIR TEMPERATURE THE UNIT WILL CONTROL TO WHEN IN THE UNOCCUPIED HEATING MODE.
DAY OF MONTH	THIS PARAMETER IS USED TO ENTER THE CURRENT DAY OF THE MONTH, 1 - 31
DAY OF WEEK	THIS PARAMETER IS USED TO ENTER THE DAY OF THE WEEK (1-7) WITH 1 EQUAL TO SUNDAY
DEMAND VENTILATION (IAQ) ENABLED	THIS PARAMETER MUST BE TURNED ON TO ENABLE DEMAND VENTILATION. DEMAND VENTILATION INCREASE THE AMOUNT OF VENTILATION AIR IN RESPONSE TO A INCREASE IN THE CO2 LEVEL IN THE CONDITIONED SPACE
DEMAND VENTILATION (IAQ) VALUE (CO2)	THIS THE CO2 INPUT VALUE TO THE UNIT CONTROLLER IN PPM
DIFFERENTIAL ENTHALPY MODE ENABLED	THIS PARAMETER MUST BE TURNED ON IN ORDER TO USE DIFFERENTIAL ENTHALPY
DIRTY FILTER SWITCH DATA	THIS PARAMETER GIVE THE STATUS OF THE DIRTY FILTER SWITCH, 0 = CLEAN, 1 = DIRTY

Continued on next page

TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
DIRTY FILTER SWITCH INSTALLED	THIS PARAMETER MUST BE SET TO ON TO ENABLE THE DIRTY FILTER FEATURE ON THE UNIT. A DIRTY FILTER SWITCH MUST ALSO BE INSTALLED FOR THIS FEATURE TO FUNCTION
DUCT PRESSURE SETPOINT	THE UNIT CONTROLLER VARIES THE SPEED OF THE SUPPLY FAN ON A VAV UNIT TO MAINTAIN THIS PROGRAMMED SETPOINT
DUCT PRESSURE SHUTDOWN SETPOINT	IF THE DUCT STATIC PRESSURE ON A VAV UNIT EXCEED THIS VALUE THE UNIT WILL SHUT DOWN THE FAN AND LOCK OUT THE UNIT
DUCT STATIC READING	THIS PARAMETER GIVES THE CURRENT VALUE OF THE DUCT STATIC PRESSURE INPUT
ECONOMIZER DAMPER OUTPUT STATUS	THIS GIVES THE STATUS OF THE UNIT CONTROLLER OUTPUT TO THE ECONOMIZER DAMPER IN %
ECONOMIZER DAMPER POSITION FOR EXHAUST TURN OFF	WHEN ON/OFF EXHAUST IS BEING USED THIS IS THE POSITION OF THE ECONOMIZER DAMPER TO TURN OFF THE EXHAUST FAN
ECONOMIZER DAMPER POSITION FOR EXHAUST TURN ON	WHEN ON/OFF EXHAUST IS BEING USED THIS IS THE POSITION OF THE ECONOMIZER DAMPER TO TURN ON THE EXHAUST FAN
ECONOMIZER FIRST STAGE SETPOINT	ON A CONSTANT VOLUME UNIT THE UNIT CONTROLLER WILL TRY AND MAINTAIN THE SUPPLY AIR TEMPERATURE AT THIS SETPOINT IN THE ECONOMIZER MODE WITH A FIRST STAGE COOLING CALL
ECONOMIZER INSTALLED	THIS PARAMETER MUST BE TURN ON TO ENABLE ECONOMIZER OPERATION
ECONOMIZER IS CURRENTLY USING FREE COOLING	THIS IDENTIFIES IF THE UNIT CONTROLLER IS USING OUTDOOR AIR TO SATISFY THE COOLING DEMAND, OFF OR ON
ECONOMIZER LOADING ENABLE	THIS PARAMETER MUST BE TURNED ON TO ENABLE ECONOMIZER LOADING
ECONOMIZER MINIMUM POSITION	THIS PARAMETER ESTABLISHES THE POSITION OF THE OUTDOOR DAMPER WHEN THE ECONOMIZER IS INACTIVE AND THE UNIT IS IN THE OCCUPIED MODE
ECONOMIZER OUTSIDE AIR ENTHALPY SETPOINT	THIS IS THE OUTDOOR ENTHALPY SETTING WHICH DETERMINES WHEN TO SWITCH INTO AND OUT OF ECONOMIZER OPERATION IN SINGLE ENTHALPY ECONOMIZER MODE
ECONOMIZER OUTSIDE AIR TEMP ENABLE SETPOINT	THIS IS THE OUTDOOR TEMPERATURE WHICH DETERMINES WHEN TO SWITCH INTO AND OUT OF ECONOMIZER OPERATION
ECONOMIZER SECOND STAGE SETPOINT	ON A CONSTANT VOLUME UNIT THE UNIT CONTROLLER WILL TRY AND MAINTAIN THE SUPPLY AIR TEMPERATURE AT THIS SETPOINT IN THE ECONOMIZER MODE WITH A SECOND STAGE COOLING CALL
ERV INSTALLED	THIS PARAMETER MUST BE TURNED ON IF AN ENERGY RECOVERY VENTILATOR IS INSTALLED. THIS FEATURE IS CURRENTLY NOT AVAILABLE ON THESE UNITS

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TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
ERV UNOCCUPIED FAN ENABLE	THIS PARAMETER ALLOWS THE EXHAUST FAN TO OPERATE ANYTIME THE SUPPLY FAN IS ON. THIS FEATURE IS REQUIRED WHEN AN ENERGY RECOVERY VENTILATOR IS INSTALLED. THIS FEATURE IS CURRENTLY NOT USED ON THESE UNITS.
EXHAUST DAMPER POSITION FOR EXHAUST TO TURN OFF	WHEN MODULATING DAMPER EXHAUST IS BEING USED THIS IS THE POSITION OF THE EXHAUST DAMPER TO TURN OFF THE EXHAUST FAN
EXHAUST DAMPER POSITION FOR EXHAUST TO TURN ON	WHEN MODULATING DAMPER EXHAUST IS BEING USED THIS IS THE POSITION OF THE EXHAUST DAMPER TO TURN ON THE EXHAUST FAN
EXHAUST FAN OUTPUT	THIS GIVES THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO THE EXHAUST FAN, OFF OR ON
EXHAUST DAMPER / VFD OUTPUT STATUS	THIS GIVES THE STATUS OF THE ANALOG UNIT CONTROLLER OUTPUT TO THE EXHAUST DAMPER OR EXHAUST FAN VFD IN %
EXHAUST VFD INSTALLED	THIS PARAMETER IDENTIFIES TO THE UNIT CONTROLLER THAT AN EXHAUST FAN VFD IS INSTALLED. THE PARAMETER MUST BE TURNED ON TO ENABLE THIS FEATURE
FAN (G) THERMOSTAT INPUT	THIS GIVES THE STATUS OF THE BINARY INPUT TO THE G TERMINAL OF THE UNIT CONTROLLER, OFF OR ON
FAN ASD TIMER	THIS IS THE STATUS OF THE SUPPLY FAN OFF DELAY IN SECONDS
FAN OFF DELAY TIMER FOR COOL	THIS GIVES THE STATUS OF THE COOLING TIME OFF DELAY IN SECONDS
FAN OFF DELAY TIMER FOR HEAT	THIS GIVES THE STATUS OF THE COOLING TIME OFF DELAY IN SECONDS
FAN ON DELAY TIMER FOR COOL	THIS GIVES THE STATUS OF THE COOLING TIME ON DELAY IN SECONDS
FAN ON DELAY TIMER FOR HEAT	THIS GIVES THE STATUS OF THE COOLING TIME ON DELAY IN SECONDS
FREEZE THERMOSTAT SWITCH	THIS IS THE BINARY INPUT FROM THE HYDRONIC HEAT FREEZE STAT TO THE UNIT CONTROLLER. OFF = FAULTED, ON = NORMAL OPERATION
GAS VALVE #1	THIS IS THE STATUS OF THE BINARY INPUT FROM THE GAS VALVE FOR HEAT SECTION 1 TO THE UNIT CONTROLLER OFF / ON
GAS VALVE #2	THIS IS THE STATUS OF THE BINARY INPUT FROM THE GAS VALVE FOR HEAT SECTION 2 TO THE UNIT CONTROLLER OFF / ON
GAS VALVE #3	THIS IS THE STATUS OF THE BINARY INPUT FROM THE GAS VALVE FOR HEAT SECTION 3 TO THE UNIT CONTROLLER OFF / ON
HEAT 1 (W1)	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL W1 - FIRST STAGE HEATING
HEAT 1 ASCD TIMER	THIS GIVES THE ACTUAL TIME OF THE OFF CYCLE TIMER FOR HEAT SECTION 1 IN SECONDS.

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TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
HEAT 1 MIN RUN TIMER	THIS GIVES THE ACTUAL TIME OF THE MINIMUM RUN TIME TIMER FOR HEAT SECTION 1 IN SECONDS
HEAT 2 (W2)	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL W2 - SECOND STAGE HEATING
HEAT 2 ASCD TIMER	THIS GIVES THE ACTUAL TIME OF THE OFF CYCLE TIMER FOR HEAT SECTION 2 IN SECONDS.
HEAT 2 MIN RUN TIMER	THIS GIVES THE ACTUAL TIME OF THE MINIMUM RUN TIME TIMER FOR HEAT SECTION 2 IN SECONDS
HEAT 3 (W3)	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL W3 - THIRD STAGE HEATING
HEAT 3 ASCD TIMER	THIS GIVES THE ACTUAL TIME OF THE OFF CYCLE TIMER FOR HEAT SECTION 3 IN SECONDS.
HEAT 3 MIN RUN TIMER	THIS GIVES THE ACTUAL TIME OF THE MINIMUM RUN TIME TIMER FOR HEAT SECTION 3 IN SECONDS
HEAT FAN OFF DELAY	IN THE INTERMITTENT FAN MODE THIS IS THE TIME DELAY BETWEEN THE TIME THE HEAT CALL IS TERMINATED AND THE SHUT DOWN OF THE SUPPLY FAN
HEAT FAN ON DELAY	IN THE INTERMITTENT FAN MODE THIS IS THE TIME DELAY BETWEEN THE TIME THE HEATING OPERATION IS VERIFIED AND THE START OF SUPPLY FAN OPERATION
HEATING MODE ENABLED FOR OPERATION	THIS PARAMETER MUST BE TURNED ON TO ALLOW HEATING OPERATION
HEATING NUMBER #1 ACCUMULATED RUNTIME	THIS IS THE NUMBER OF HOURS THAT HEATING SYSTEM 1 HAS BEEN OPERATIVE
HEATING NUMBER #2 ACCUMULATED RUNTIME	THIS IS THE NUMBER OF HOURS THAT HEATING SYSTEM 2 HAS BEEN OPERATIVE
HEATING NUMBER #3 ACCUMULATED RUNTIME	THIS IS THE NUMBER OF HOURS THAT HEATING SYSTEM 3 HAS BEEN OPERATIVE
HEATING OUTPUT #1 (H1)	THIS IS THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO HEAT SECTION # 1, OFF/ON
HEATING OUTPUT #2 (H2)	THIS IS THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO HEAT SECTION # 2, OFF/ON
HEATING OUTPUT #3 (H3)	THIS IS THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO HEAT SECTION # 3, OFF/ON
HOT GAS PRESENT ON COMPRESSOR # 1	THIS PARAMETER MUST BE TURNED ON WHEN HOT GAS BYPASS IS INSTALLED
HOT GAS REHEAT	THIS PARAMETER WOULD BE TURNED ON TO ENABLE HOT GAS REHEAT. THIS FEATURE IS NOT AVAILABLE ON THESE UNITS
HOT WATER VALVE OUTPUT STATUS	THIS GIVES THE STATUS OF THE ANALOG UNIT CONTROLLER OUTPUT TO THE HYDRONIC VALVE IN %
HOT WATER VALVE OUTPUT STATUS (REVERSE ACTING)	THIS GIVES THE STATUS OF THE ANALOG UNIT CONTROLLER OUTPUT TO THE HYDRONIC VALVE IN % WHEN THE UNIT IS PROGRAMMED FOR A REVERSE ACTING VALVE
HOUR	THIS PARAMETER IS USED TO ENTER THE HOUR OF THE CURRENT TIME BASED ON A 24 HOUR SCHEDULE, 13 WOULD BE 1 PM

Continued on next page

TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
HSP1	THIS IS THE STATUS OF THE BINARY INPUT FROM THE HIGH PRESSURE SWITCH FOR COMPRESSOR SYSTEM 1 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
HSP2	THIS IS THE STATUS OF THE BINARY INPUT FROM THE HIGH PRESSURE SWITCH FOR COMPRESSOR SYSTEM 2 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
HSP3	THIS IS THE STATUS OF THE BINARY INPUT FROM THE HIGH PRESSURE SWITCH FOR COMPRESSOR SYSTEM 3 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
HSP4	THIS IS THE STATUS OF THE BINARY INPUT FROM THE HIGH PRESSURE SWITCH FOR COMPRESSOR SYSTEM 4 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
HYDRONIC HEAT ACTUATOR VALVE REVERSE ACTING	THIS PARAMETER REVERSES THE ACTION OF THE HYDRONIC VALVE. WHEN THE PARAMETER IS TURNED ON A 2 VOLT INPUT TO THE VALVE IS FULL OPEN AND A 10 VOLT INPUT TO THE VALVE IS FULL CLOSED
HYDRONIC HEATING ENABLED	THIS PARAMETER MUST BE TURNED ON TO ENABLE HYDRONIC HEATING OPERATION
HYDRONIC HEATING STAGE #1 SUPPLY AIR SETPOINT	THIS PARAMETER ESTABLISHES THE SETPOINT FOR CONSTANT VOLUME HYDRONIC HEATING OPERATION DURING FIRST STAGE OPERATION
HYDRONIC HEATING STAGE #2 SUPPLY AIR SETPOINT	THIS PARAMETER ESTABLISHES THE SETPOINT FOR CONSTANT VOLUME HYDRONIC HEATING OPERATION DURING SECOND STAGE OPERATION AND ALSO THE CONTROL SETPOINT FOR VAV HYDRONIC HEATING OPERATION
IAQ SENSOR RANGE	THIS PARAMETER IDENTIFIES TO THE UNIT CONTROLLER THE RANGE OF THE CO2 SENSOR IN PPM
IAQ SETPOINT	THE UNIT CONTROLLER WILL TRY AND MAINTAIN THE CO2 LEVEL IN THE SPACE TO WITHIN +/- 100 PPM OF THIS VALUE
INDOOR FAN (G)	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL G - SUPPLY FAN
INDOOR FAN MIN RUN TIME	THIS GIVES THE STATUS OF THE MINIMUM SUPPLY FAN RUN TIME IN SECONDS
INDOOR FAN OUTPUT	THIS GIVES THE STATUS OF THE BINARY OUTPUT FROM THE UNIT CONTROLLER TO THE SUPPLY FAN
INDOOR FAN VFD OUTPUT	THIS GIVES THE STATUS OF THE ANALOG OUTPUT FROM THE UNIT CONTROLLER TO THE SUPPLY FAN IN %
INPUT AIR PROVING SWITCH	THIS IS THE STATUS OF THE AIR PROVING SWITCH INPUT TO THE UNIT CONTROLLER, OFF OR ON
INPUT DIRTY FILTER SWITCH	THIS IS THE STATUS OF THE DIRTY FILTER SWITCH INPUT TO THE UNIT CONTROLLER, OFF - CLEAN FILTER, ON - DIRTY FILTER
INPUT INDOOR FAN OVERLOAD SWITCH	THIS GIVES THE STATUS OF THE BINARY INPUT FROM THE SUPPLY FAN OVERLOAD TO THE UNIT CONTROLLER, OFF - FAULT, ON - NORMAL OPERATION

Continued on next page

TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
INTELLI-START OPERATION ENABLE	THIS FEATURE IS ONLY AVAILABLE ON CONSTANT VOLUME UNITS WITH A SPACE SENSOR USING THE INTERNAL SCHEDULE. THIS OPTION BRINGS THE UNIT UP TO THE CV OCCUPIED COOLING OR CV OCCUPIED HEATING SETPOINTS PRIOR TO THE BEGINNING OF OCCUPIED OPERATION.
LAST ALARM 1	THIS PARAMETER IDENTIFIES THE MOST RECENT ALARM
LAST ALARM 2	THIS PARAMETER IDENTIFIES THE ALARM PRECEDING ALARM 1
LAST ALARM 3	THIS PARAMETER IDENTIFIES THE ALARM PRECEDING ALARM 2
LAST ALARM 4	THIS PARAMETER IDENTIFIES THE ALARM PRECEDING ALARM 3
LAST ALARM 5	THIS PARAMETER IDENTIFIES THE ALARM OLDEST IN HISTORY
LEAD-LAG EQUALIZE COMPRESSOR RUN TIME ENABLED	THIS PARAMETER ENABLES LEAD LAG OPERATION FOR THE COMPRESSOR, OFF OR ON
LIMIT SWITCH #1	THIS GIVES THE STATUS OF THE BINARY INPUT FROM THE LIMIT SWITCH TO THE UNIT CONTROLLER FOR HEAT SECTION 1 IN SECONDS. OFF - FAULTED, ON - NORMAL
LIMIT SWITCH #2	THIS GIVES THE STATUS OF THE BINARY INPUT FROM THE LIMIT SWITCH TO THE UNIT CONTROLLER FOR HEAT SECTION 2 IN SECONDS. OFF - FAULTED, ON - NORMAL
LIMIT SWITCH #3	THIS GIVES THE STATUS OF THE BINARY INPUT FROM THE LIMIT SWITCH TO THE UNIT CONTROLLER FOR HEAT SECTION 3 IN SECONDS. OFF - FAULTED, ON - NORMAL
LOADSHED	THIS FEATURE CAN BE USED TO TEMPORALLY REDUCE THE ELECTRICAL CONSUMPTION OF THE UNIT BY TURNING OFF ALL OF THE ACTIVE COMPRESSORS. THIS FEATURE IS ONLY AVAILABLE THROUGH A COMMUNICATED INPUT.
LOW AC SUPPLY VOLTAGE DETECTED	THIS PARAMETER IDENTIFIES IF THE SUPPLY VOLTAGE TO THE CONTROL IS OUTSIDE THE ACCEPTABLE LIMITS. OFF = WITHIN LIMITS, ON = FAULTED, OUTSIDE LIMITS
LOW AMBIENT ECONOMIZER MINIMUM POSITION	THIS PARAMETER ESTABLISHES THE MINIMUM POSITION FOR THE OUTDOOR AIR DAMPER DURING LOW AMBIENT OPERATION
LOW AMBIENT ECONOMIZER SETPOINT	THIS PARAMETER IS USED TO TURN ON AND SET THE OUTDOOR TEMPERATURE AT WHICH THIS FEATURE BECOMES ACTIVE. A 0 VALUE TURNS THE FEATURE OFF. THIS FEATURE REDUCES THE MINIMUM VENTILATION POSITION OF THE OUTDOOR DAMPER DURING TIMES OF COLD OUTDOOR TEMPERATURES
LOW AMBIENT KIT INSTALLED	THIS PARAMETER MUST BE TURNED ON IF A LOW AMBIENT VFD IS INSTALLED ON THE CONDENSER FAN. THIS ALLOWS COMPRESSOR OPERATION BELOW 45.0° F
LPS1	THIS IS THE STATUS OF THE BINARY INPUT FROM THE LOW PRESSURE SWITCH FOR COMPRESSOR SYSTEM 1 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
LPS2	THIS IS THE STATUS OF THE BINARY INPUT FROM THE LOW PRESSURE SWITCH FOR COMPRESSOR SYSTEM 2 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.

Continued on next page

TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
LPS3	THIS IS THE STATUS OF THE BINARY INPUT FROM THE LOW PRESSURE SWITCH FOR COMPRESSOR SYSTEM 3 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
LPS4	THIS IS THE STATUS OF THE BINARY INPUT FROM THE LOW PRESSURE SWITCH FOR COMPRESSOR SYSTEM 4 TO THE UNIT CONTROLLER. ON - OKAY, OFF - FAULTED.
MAXIMUM IAQ ECONOMIZER POSITION	THIS PARAMETER ESTABLISHED THE MAXIMUM POSITION THE OUTDOOR DAMPER CAN OPEN TO IN THE DEMAND VENTILATION MODE
METER OF UNOCCUPIED OVERRIDE ENABLED	THIS PARAMETER GIVES THE STATUS OF THE UNOCCUPIED OVERRIDE INPUT. OFF MEANS IT IS NOT IN OVERRIDE MODE AND ON MEANS IT IS IN OVERRIDE MODE.
METRIC OPERATION	WHEN THIS OPTION IS TURNED ON THE TEMPERATURE DATA WILL BE CONVERTED TO METRIC UNITS. 0 = IMPERIAL, 1 = METRIC
MINIMUM RUN TIME FOR COMPRESSORS	THIS PARAMETER ESTABLISHES THE MINIMUM RUN TIME FOR THE COMPRESSORS, 1 TO 10 MINUTES
MINUTE	THIS PARAMETER IS USED TO ENTER THE MINUTES OF THE CURRENT TIME.
MODULATING POWER EXHAUST INSTALLED	THIS PARAMETER MUST BE TURNED ON IN ORDER TO USE MODULATING EXHAUST, EITHER DAMPER OR VFD
MONTH	THIS PARAMETER IS USED TO ENTER THE CURRENT MONTH 1 TO 12. FOR EXAMPLE 1 WOULD BE JANUARY
MORNING WARM-UP / VAV RETURN AIR TEMP SETPOINT	THIS PARAMETER IS USED TO DETERMINE THE ON AND OFF POINTS FOR VAV OCCUPIED HEATING OPERATION IN THE STAND ALONE OR SPACE SENSOR MODE OF OPERATION. IT IS ALSO USED TO CONTROL THE HEATING OPTION IN THE MORNING WARM-UP MODE.
MORNING WARM-UP ENABLE	THIS PARAMETER MUST BE TURNED ON TO ENABLE MORNING WARM-UP OPERATION
NETWORK OCCUPIED FLAG	THIS GIVES THE STATUS OF THE COMMUNICATED OCCUPIED COMMAND, OFF UNOCCUPIED, ON OCCUPIED
OCC INPUT	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL OCC - OCCUPIED INPUT
OCCUPIED INPUT ENABLED	THIS PARAMETER MUST BE TURNED ON IN ORDER TO USE THE HARD WIRED OR COMMUNICATED OCCUPIED INPUT. IT MUST BE TURNED OFF IN ORDER TO USE THE DAILY OR HOLIDAY SCHEDULING FEATURE
OUTDOOR AIR TEMP COOLING LOCKOUT	THIS PARAMETER ESTABLISHES AN OUTDOOR SET POINT TO LOCKOUT COOLING OPERATION. WHEN THE TEMPERATURE IS BELOW THIS SETTING COOLING IS LOCKED OUT
OUTDOOR AIR TEMP HEATING LOCKOUT	THIS PARAMETER ESTABLISHES AN OUTDOOR SET POINT TO LOCKOUT HEATING OPERATION. WHEN THE TEMPERATURE IS ABOVE THIS SETTING HEATING IS LOCKED OUT
OUTSIDE AIR ENTHALPY	THIS PARAMETER IS THE CALCULATED VALUE FOR THE OUTDOOR AIR ENTHALPY

Continued on next page

TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
OUTSIDE AIR HUMIDITY	THIS PARAMETER GIVES THE CURRENT VALUE OF THE OUTSIDE AIR HUMIDITY INPUT
OUTSIDE AIR HUMIDITY SENSOR INSTALLED	THIS PARAMETERS IDENTIFIES TO THE UNIT CONTROLLER THAT AN OUTDOOR AIR HUMIDITY SENSOR IS INSTALLED
OUTSIDE AIR TEMP	THIS PARAMETER GIVES THE CURRENT VALUE FOR THE OUTDOOR AIR TEMPERATURE INPUT
POWER EXHAUST INSTALLED	THIS PARAMETER MUST BE TURNED ON TO ENABLE POWER EXHAUST OPERATION
PRE-OCCUPANCY PURGE ENABLE	THIS PARAMETER IS USED TO TURN ON THE PRE-OCCUPANCY PURGE OPTION. THIS FEATURE TURNS ON THE SUPPLY FAN AND OPENS THE OUTDOOR AIR DAMPER PRIOR TO GOING INTO THE OCCUPIED MODE.
PRE-OCCUPANCY PURGE TIME (HOURS OF DAY)	THIS PARAMETER ESTABLISHES THE NUMBER OF HOURS PRIOR TO THE OCCUPIED START TIME THAT THE PRE-OCCUPANCY PURGE WOULD START
PRE-OCCUPANCY PURGE TIME (MINUTES OF DAY)	THIS PARAMETER ESTABLISHES THE NUMBER OF MINUTES PRIOR TO THE OCCUPIED START TIME THAT THE PRE-OCCUPANCY PURGE WOULD START
PURGE SWITCH	THIS IS THE STATUS OF THE BINARY INPUT TO TERMINAL PURGE - PURGE MODE
REDLINE	THIS FEATURE CAN BE USED TO TEMPORALLY REDUCE THE ELECTRICAL CONSUMPTION OF THE UNIT BY TURNING OFF SOME OF THE ACTIVE COMPRESSORS. THIS FEATURE IS ONLY AVAILABLE THROUGH A COMMUNICATED INPUT.
REMOTE CONTROL INPUT ENABLE FOR THIRD PARTY BAS	THIS ALLOWS THE USE OF AN EXTERNAL 0 TO 10 VDC SIGNAL TO RESET THE SUPPLY AIR TEMPERATURE SETPOINT ON VAV UNITS.
REMOTE CONTROL INPUT VALUE	GIVES THE VALUE OF THE 0 TO 10 VDC REMOTE CONTROL INPUT FOR THE REMOTE CONTROL OF THE DAMPERS
RETURN AIR ENTHALPY	THIS PARAMETER IS THE CALCULATED VALUE FOR THE RETURN AIR ENTHALPY
RETURN AIR HUMIDITY	THIS PARAMETER GIVES THE CURRENT VALUE OF THE RETURN AIR HUMIDITY INPUT
RETURN AIR HUMIDITY SENSOR INSTALLED	THIS IS THE RETURN ENTHALPY SETTING WHICH THE UNIT CONTROLLER USES TO DETERMINE WHEN TO SWITCH INTO ECONOMIZER OPERATION IN DUAL ENTHALPY ECONOMIZER MODE
RETURN AIR TEMP	THIS PARAMETER GIVE THE CURRENT VALUE FOR THE RETURN AIR TEMPERATURE INPUT
RUN TEST	BY TURNING THIS FEATURE ON THE UNIT CONTROLLER SEQUENCING ON ALL THE BINARY OUTPUTS TO VERIFY OPERATION OF THE UNIT ELECTRICAL DEVICES
SENSOR SPACE TEMPERATURE SENSOR OUTSET	THIS IS THE ACTUAL SPACE SENSOR OFFSET AMOUNT BEING USED BY THE UNIT CONTROLLER IN DEGREES.

Continued on next page

TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
SPACE SENSOR DETECTED	IDENTIFIES IF THE UNIT CONTROLLER HAS DETECTED THE PRESENCE OF A SPACE SENSOR. IF THE UNIT CONTROLLER DETECTS A SPACE SENSOR IT WILL SELF CONFIGURE TO USE IT FOR CONTROL OF THE UNIT.
SPACE SENSOR FAULT OVERRIDE ENABLE	WHEN THIS OPTION IS TURNED ON THE CONTROLLER USES THE RETURN AIR TEMPERATURE INPUT IN PLACE OF THE SPACE TEMPERATURE INPUT TO CONTROL THE UNIT. TURING THIS OPTION ON ALLOWS THE UNIT TO OPERATE IN A VAV STAND ALONE MODE
SPACE TEMP	THIS PARAMETER GIVES THE CURRENT VALUE OF THE SPACE TEMPERATURE INPUT
SPACE TEMP TRENDING ALARM TEMP	TO ENABLE THIS FEATURE THE PARAMETER MUST BE SET TO OTHER THEN 0. A VALUE OTHER THEN 0 IS THE NUMBER OF DEGREES ABOVE OR BELOW THE SETPOINT THE TEMPERATURE MUST BE TO START THE TIMING
SPACE TEMP TRENDING ALARM TIME	THIS PARAMETER ESTABLISHED THE AMOUNT OF TIME THE SPACE TEMPERATURE MUST BE TRENDING ABOVE OR BELOW THE SPACE TEMP TRENDING ALARM TEMP BEFORE THE ALARM WILL BE INITIATED.
SPACE TEMPERATURE OFFSET RANGE	THIS SETPOINT ESTABLISHES THE MAXIMUM AMOUNT OF HEATING OR COOLING RESET AVAILABLE THROUGH THE RESET FEATURE ON A SPACE SENSOR.
STAGES OF HEAT AVAILABLE	THIS PARAMETER IDENTIFIES THE NUMBER OF STAGES OF HEAT THE UNIT CONTROLLER IS SET UP TO CONTROL
STATE COMPRESSOR OFF - LOW SUPPLY VOLTAGE	THIS IDENTIFIES THE COMPRESSORS ARE OFF BECAUSE OF LOW SUPPLY VOLTAGE. ON WHEN THIS STATE IS ACTIVE
STATE COMPRESSORS OFF - LOW AMBIENT TEMPERATURE	THIS IDENTIFIES THE COMPRESSOR ARE OFF BECAUSE THE OUTDOOR TEMPERATURE IS BELOW THE LOW AMBIENT LOCKOUT TEMPERATURE. ON WHEN THIS STATE IS ACTIVE
STATUS COMPRESSOR OFF - ECON IS USING FREE COOLING	THIS IDENTIFIES THE COMPRESSORS ARE OFF BECAUSE THE UNIT CONTROLLER IS USING OUTDOOR AIR FOR COOLING. ON WHEN THIS IS ACTIVE
SUPPLY AIR TEMP	THIS PARAMETER GIVES THE CURRENT VALUE FOR THE SUPPLY AIR TEMPERATURE INPUT
SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING	TO ENABLE THIS FEATURE THE PARAMETER MUST BE SET TO OTHER THEN 0. A VALUE OTHER THEN 0 ESTABLISHES THE SETPOINT TO USE IN DETERMINE WHEN TO INITIATE A SUPPLY AIR TEMP ALARM FOR COOLING
SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING	TO ENABLE THIS FEATURE THE PARAMETER MUST BE SET TO OTHER THEN 0. A VALUE OTHER THEN 0 ESTABLISHES THE SETPOINT TO USE IN DETERMINE WHEN TO INITIATE A SUPPLY AIR TEMP ALARM FOR HEATING
SUPPLY AIR TEMP LIMIT COOLING SETPOINT	THIS SET POINT IS USED BY THE UNIT CONTROLLER DURING ECONOMIZER LOADING OR SUPPLY AIR TEMP LIMIT MODE OF OPERATION

Continued on next page

TABLE 7-1 – DEFINITIONS (CONTINUED)

MENU ITEM	DEFINITION
SUPPLY AIR TEMP LIMIT FOR COOLING ENABLE	THIS PARAMETER MUST BE TURNED ON TO ENABLE SUPPLY AIR TEMP LIMIT OPERATION IN THE COOLING MODE ON A CONSTANT VOLUME UNIT
SUPPLY AIR TEMP LIMIT FOR HEATING ENABLED	THIS PARAMETER MUST BE TURNED ON TO ENABLE SUPPLY AIR TEMP LIMIT OPERATION IN THE HEATING MODE ON A CONSTANT VOLUME UNIT
SUPPLY AIR TEMP LIMIT HEATING SETPOINT	THIS PARAMETER IS USED BY THE UNIT CONTROLLER DURING SUPPLY AIR TEMP LIMIT FOR HEATING OPERATION ON A CONSTANT VOLUME UNIT.
TEMPERATURE/HUMIDITY (RETURN) CONTROL ENABLED	THIS PARAMETER WOULD BE USED IF HOT GAS REHEAT WAS BEING USED. THIS FEATURE IS NOT AVAILABLE ON THESE UNITS. THIS SHOULD ALWAYS BE SET TO OFF
THIRD PARTY BAS ECONOMIZER ENABLED	WHEN THIS PARAMETER IS TURNED ON THE POSITION OF THE ECONOMIZER DAMPER IS CONTROLLED BY AN EXTERNAL 2-10 VDC INPUT
TURN OFF CONTINUOUS FAN WHEN STARTING HEAT	IF THIS PARAMETER IS TURNED ON AND THE UNIT IS RUNNING CONTINUOUS FAN, THE CONTROL WILL STOP THE SUPPLY FAN AT THE START OF A HEATING CYCLE AND TURN IT BACK ON BASED ON THE FAN ON FOR HEAT SETTING
UNIT MODEL NUMBER	THIS ALLOWS THE UNIT MODEL NUMBER TO BE ENTERED FOR THE UNIT THROUGH THE SIMPLICITY PC SOFTWARE
UNIT NAME	THIS ALLOWS A NAME TO BE ASSIGNED TO THE UNIT TO IDENTIFY IT ON THE NETWORK THROUGH THE SIMPLICITY PC SOFTWARE
UNIT SERIAL NUMBER	THIS ALLOWS THE UNIT SERIAL NUMBER TO BE ENTERED FOR THE UNIT THROUGH THE SIMPLICITY PC SOFTWARE
UNOCCUPIED OVERRIDE TIME PERIOD	THIS PARAMETER ESTABLISHES THE MAXIMUM TIME THE UNIT WILL REMAIN IN THE UNOCCUPIED OVERRIDE MODE WHEN THE OVERRIDE BUTTON IS PUSHED ON THE SPACE SENSOR.
VAV / CV SELECTION	THIS PARAMETER GIVES THE STATUS OF THE SET UP OF THE UNIT , VAV OR CV
VAV COOLING SUPPLY AIR TEMP LOWER SETPOINT	THIS PARAMETER ESTABLISHES THE LOWER COOLING SETPOINT FOR VAV COOLING OPERATION
VAV COOLING SUPPLY AIR TEMP UPPER SETPOINT	THIS PARAMETER ESTABLISHES THE UPPER COOLING SETPOINT FOR VAV COOLING OPERATION
VAV OCCUPIED HEATING ENABLED	THIS PARAMETER MUST BE TURNED ON TO ALLOW OCCUPIED HEATING OPERATION.
VAV OCCUPIED HEATING SETPOINT	THE UNIT CONTROLLER COMPARES THE SPACE TEMPERATURE TO THIS VALUE AS ONE OF THE CRITERIA TO USE TO DETERMINE WHEN TO INITIATE VAV OCCUPIED HEATING OPERATION
VAV SUPPLY AIR TEMP RESET SETPOINT	THE UNIT CONTROLLER COMPARES THE SPACE OR RETURN AIR TEMPERATURE TO THIS VALVE TO DETERMINE IF IT SHOULD CONTROL TO THE VAV COOLING SUPPLY AIR UPPER OR LOWER SETPOINT
YEAR	THIS PARAMETER IS USED TO ENTER THE CURRENT YEAR 0 TO 99. FOR EXAMPLE 7 WOULD BE 2007

SECTION 8 – SERVICE

ANALOG INPUT OPERATION

This section describes the control operation of the (29) twenty-nine analog inputs. These inputs are used by the control to monitor and respond to unit temperatures, pressures, enthalpy, etc. The location of each of these connections on the Unit Controller is contained in Table 8-8. Notice that the ID gives the jack connection designated as "J" and then the identifying number of the connector, followed by a – and then the pin number of the connector. For example the SUPPLY AIR TEMPERATURE analog input would be found at J1-1. This is connector J1 – Pin 1. As the Unit Control board is positioned in the control box the top row of the J series connectors is the input, the middle row is the common, and the bottom row is the 5 VDC input to the sensor. Also the pin in the right hand top corner is pin 1.

Temperature Sensors

The temperature sensors are all 10K Type III Thermistors. The relationship between the temperature and the voltage output and resistance is contained in Table 8-1 .The following analog input are of this type: Supply Air Temperature, Heat Entering Temp, Flex Evap Temp, Outside Air Temp, Return Air Temp, Suction Temp #1, Suction Temp #2, Zone Temp, and Under Floor Temp.

Duct Pressure Transducer

The Duct Pressure Transducer is located behind the right hand damper door. The purpose of the transducer is to sense and convert the static pressure in the supply-side of the duct to a 0 to 5 volt DC voltage. The DC voltage is sent to the Unit Controller and compared against the *"DUCT STATIC PRESS ACTIVE SP"*. The transducer is factory wired, but pneumatic tubing must be field supplied and installed *(refer to Section 2* "INSTALLATION" *in this manual)*. The Duct Static Pressure Transducer measures differential pressure between the pressure in the duct and atmospheric pressure. When verifying transducer operation, the technician must insert a tee in the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the duct pressure vs. output volts DC from the transducer. Table 8-2 shows the relationship between the pressure applied to the duct pressure transducer and the output voltage. The output is linear between 0" WC and the SPAN. The *"DUCT PRESS TRANSDUCER SPAN"* can be set to 1.25, 2.5 or 5" WC. The *"DUCT PRESS TRANSDUCER SPAN"* must always be set based on the span of the transducer installed.

TABLE 8-1 – TEMPERATURE SENSOR RESISTANCE

°F	VOLTAGE	RESISTANCE	°C
-25	0.49	139,639	-30.6
-20	0.53	127,453	-28.9
-15	0.60	109,624	-26.1
-10	0.69	94,519	-23.34
-5	0.78	81,665	-20.55
0.0	0.88	70,750	-17.78
5	0.98	61,418	-15.00
10	1.10	53,426	-12.22
15	1.22	46,582	-9.44
20	1.35	40,703	-6.67
25	1.48	35,639	-3.89
30	1.62	31,269	-1.11
35	1.77	27,490	1.67
40	1.91	24,219	4.44
45	2.06	21,377	7.22
50	2.21	18,900	10.00
55	2.36	16,744	12.78
60	2.51	14,681	15.56
65	2.66	13,216	18.33
70	2.80	11,771	21.11
75	2.94	10,502	23.89
80	3.08	9,388	26.67
85	3.21	8,404	29.45
90	3.33	7,537	32.22
95	3.45	6,770	35.0
100	3.56	6,090	37.78
105	3.66	5,487	40.56
110	3.76	4,951	43.34
115	3.85	4,475	46.11
120	3.94	4,050	48.89
125	4.02	3,671	51.66
130	4.09	3,332	54.44
135	4.16	3,029	57.22

TABLE 8-2 – DUCT PRESSURE TRANSDUCER

1.25" WC SPAN DIFFERENTIAL INPUT PRESS	2.5" WC SPAN DIFFERENTIAL INPUT PRESS	5.0" WC SPAN DIFFERENTIAL INPUT PRESS	VOLTAGE VDC
0.125	0.25	0.5	0.50
0.25	0.50	1.0	1.00
0.375	0.75	1.50	1.50
0.50	1.00	2.00	2.00
0.625	1.25	2.50	2.50
0.75	1.50	3.00	3.00
0.875	1.75	3.50	3.50
1.00	2.00	4.00	4.00
1.125	2.25	4.50	4.50
1.25	2.50	5.00	5.00

Building Pressure Transducer

The Building Pressure Transducer is located behind the right hand damper door. The purpose of the transducer is to sense and convert the static pressure in the building to a 0 to 5 volt DC voltage. The DC voltage is then sent to the Unit Controller and compared against the *"BUILDING PRESSURE ACTIVE SETPOINT"*. The transducer is factory wired, but pneumatic tubing must be field supplied and installed *(refer to Section 2 "INSTALLATION" in this manual)*. The Building Pressure Transducer measures differential pressure in the building and atmospheric pressure. When verifying transducer operation, the technician can inset a tee into the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the building pressure vs. output volts DC from the transducer. A practical and quick check of this transducer can also be accomplished by removing the pneumatic tubing lines from both the low and high side connections on the transducer. Since both of the inputs will now be exposed to the same pressure, the differential pressure will be zero, and the output 2.5 volts DC according to Table 8-3.

TABLE 8-3 – BUILDING PRESSURE TRANSDUCER OUTPUT

DIFFERENTIAL INPUT PRESSURE - IWC	OUPTUT VOLTAGE - VDC
-0.50	0.00
-0.40	0.50
-0.30	1.00
-0.20	1.50
-0.10	2.00
0.00	2.50
0.10	3.00
0.20	3.50
0.30	4.00
0.40	4.50
0.50	5.00

Return Fan Pressure Transducer

If the unit is order with the Return Fan Option the unit will have a Return Fan Pressure Transducer. The transducer is behind the right hand damper door and compares the pressure in the return air compartment to atmospheric pressure. The Unit Controller varies the speed of the Return Fan in order to maintain the correct differential pressure in the return compartment. When verifying transducer operation, the technician can inset a tee into the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the return compartment pressure vs. output volts DC from the transducer. A practical and quick check of this transducer can also be accomplished by removing the pneumatic tubing lines from both the low and high side connections on the transducer. Since both of the inputs will now be exposed to the same pressure, the differential pressure will be zero, and the output 2.5 volts DC according to Table 8-4.

TABLE 8-4 – RETURN FAN PRESSURE TRANSDUCER OUTPUT

DIFFERENTIAL INPUT PRESSURE - IWC	OUPTUT VOLTAGE - VDC
-1.00	0.00
-0.80	0.50
-0.60	1.00
-0.40	1.50
-0.20	2.00
0.00	2.50
0.20	3.00
0.40	3.50
0.60	4.00
0.80	4.50
1.00	5.00

Discharge Pressure Transducer

The discharge Pressure Transducer is located in the common discharge line of the tandem compressors for each refrigerant circuit. The purpose of this transducer is to sense and convert the discharge pressure into a DC voltage. The DC voltage is then sent to the Unit Controller where it is used to control the number of condenser fan when the unit is in cooling operation. The discharge pressure value, in PSIG, is displayed by the User Interface.

The Discharge Transducer has a range of 0 to 650 PSIG, with a linear output of 0 to 5 DC volts. Table 8-5 illustrates the DC volt output from the transducer for a given discharge pressure.

Suction Pressure Transducer

The optional suction pressure transducer is located in the common suction line of the tandem compressors for each refrigerant circuit. The purpose of the transducer is to sense and convert the suction pressure to a DC voltage. The DC voltage is then sent to the Unit Controller where it is displayed by the User Interface. When this option is installed the Unit Controller will also calculate and display the Evaporator Superheat value for the system.

The Suction Transducer has a range of 0 to 400 PSIG, with a linear output of 0 to 5 volts DC. Table 8-5 illustrates the DC volt output from the transducer for a given suction pressure.

TABLE 8-5 – PRESSURE TRANSDUCERS

SUCTION TRANSDUCER		DISCHARGE TRANSDUCER	
PRESSURE PSIG	VOLTAGE VDC	PRESSURE PSIG	VOLTAGE VDC
0	0.5	0	0.5
25	0.75	32.5	0.7
50	1	65	0.9
75	1.25	97.5	1.1
100	1.5	130	1.3
125	1.75	162.5	1.5
150	2	195	1.7
175	2.25	227.5	1.9
200	2.5	260	2.1
225	2.75	292.5	2.3
250	3	325	2.5
275	3.25	357.5	2.7
300	3.5	390	2.9
325	3.75	422.5	3.1
350	4	455	3.3
375	4.25	487.5	3.5
400	4.5	520	3.7
		552.5	3.9
		585	4.1
		617.5	4.3
		650	4.5

Humidity Sensors

The humidity sensor outputs a 0 to 5 volts DC in response to the relative humidity sensed. An outdoor air humidity sensor is used whenever the economizer is configured for single or dual enthalpy. A return air humidity sensor is used whenever the economizer is configured for dual enthalpy. A humidity sensor is also used to monitor the humidity in the space between the slab and raised floor system used for FlexSys applications. Table 8-6 gives the relationship between the voltage output of the humidity sensor and the % relative humidity.

TABLE 8-6 – HUMIDITY SENSOR OUTPUTS

% RELATIVE HUMIDITY		% RELATIVE HUMIDITY	
5	0.25	55	2.75
10	0.50	60	3.00
15	0.75	65	3.25
20	1.00	70	3.50
25	1.25	75	3.75
30	1.50	80	4.00
35	1.75	85	4.25
40	2.00	90	4.50
45	2.25	95	4.75
50	2.50	100	5.00

CO_2 Sensor

Two CO_2 sensors are used in conjunction with the *"DEMAND VENTILATION"* option. In *"DEMAND VENTILATION"* the Unit Control monitors the CO_2 level of the outdoor air and the CO_2 level in the conditioned space and varies the amount of ventilation air based on the relationship between these two values. Table 8-7 gives the volts DC output for a given CO_2 level.

TABLE 8-7 – CO2 SENSOR OUTPUT

PPM CO2	OUTPUT VOLTAGE VDC	PPM CO2	OUTPUT VOLTAGE VDC
80	0.20	1120	2.80
160	0.40	1200	3.00
240	0.60	1280	3.20
320	0.80	1360	3.40
400	1.00	1440	3.60
480	1.20	1520	3.80
560	1.40	1600	4.00
640	1.60	1680	4.20
720	1.80	1760	4.40
800	2.00	1840	4.60
880	2.20	1920	4.80
960	2.40	2000	5.00
1040	2.60		

Furnace Status Input

The Unit Controller monitors the operation of the Staged and Modulating Gas Heat sections and displays the status through the STATUS screen of the User Interface. The operation of each of the gas heat sections is monitored by a multiplexer installed in the gas heat section. When a gas heat section is energized, it sends a 24-volt signal to the multiplexer. The multiplexer takes the five "ON"/"OFF" inputs and converts them into a 0 to 5 volt DC signal that is sent to the Unit Controller. The Unit Controller then decodes this analog input and displays the furnace section status. Tables 8-9 and 8-10 show the relationship between the DC voltage and the furnace operation status.

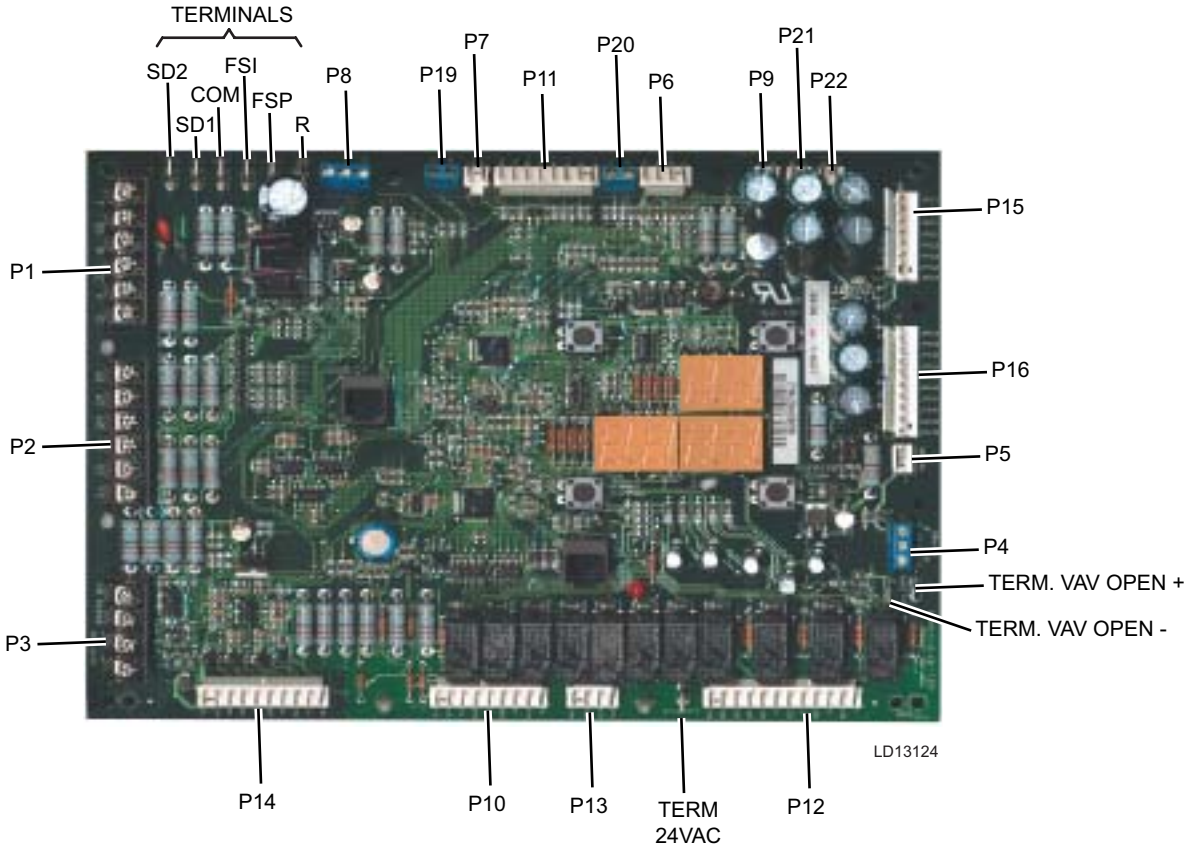

FIG. 8-1 – CONNECTOR LOCATIONS

TABLE 8-8 – WIRING DATA

CONNECTOR #	TYPE	IDENTIFICATION	WIRE #	DESCRIPTION
P9	AI	BP-	340	BUILDING PRESSURE INPUT -
P9	AI	BP+	339	BUILDING PRESSURE INPUT +
P7	AI	CV/VAV	-	CV VAV CONFIGURATION RESISTOR
P21	AI	DP-	338	DUCT STATIC PRESSURE INPUT -
P21	AI	DP+	337	DUCT STATIC PRESSURE INPUT +
P20	AI	DV-	-	DEMAND VENTILATION INPUT -
P20	AI	DV+	-	DEAMND VENTILATION INPUT +
P11	AI	OAT-	330	OUTDOOR AIR TEMPERATURE INPUT
P11	AI	OAT+	329	OUTDOOR AIR TEMPERATURE INPUT
P6	AI	OH-	334	OUTDOOR AIR HUMIDITY INPUT -
P6	AI	OH+	333	OUTDOOR AIR HUMIDITY INPUT +
P11	AI	RAT-	332	RETURN AIR TEMPERATURE -
P11	AI	RAT+	331	RETURN AIR TEMPERATURE +
P6	AI	RH-	336	RETURN AIR HUMIDITY INPUT 1
P6	AI	RH+	335	RETURN AIR HUMIDITY INPUT +
P11	AI	SAT-	309	SUPPLY AIR TEMPERATURE INPUT
P11	AI	SAT+	308	SUPPLY AIR TEMPERATURE INPUT
P14	AO	ECO-	406	OUTDOOR DAMPER OUTPUT -
P14	AO	ECO+	405	OUTDOOR DAMPER OUTPUT +
P14	AO	EXD-	408	EXHAUST FAN VFD / DAMPER OUTPUT-

Continued on next page

TABLE 8-8 – WIRING DATA (CONTINUED)

CONNECTOR #	TYPE	IDENTIFICATION	WIRE #	DESCRIPTION
P14	AO	EXD+	407	EXHAUST FAN VFD / DAMPER OUTPUT+
P14	AO	HGR-	-	NOT USED
P14	AO	HGR+	-	NOT USED
P14	AO	HWV-	410	HOT WATER VALVE OUTPUT -
P14	AO	HWV+	409	HOT WATER VALVE OUTPUT +
P14	AO	VFD-	402	SUPPLY FAN VFD OUTPUT -
P14	AO	VFD+	401	SUPPLY FAN VFD OUTPUT +
P4	COMM	RS-485 B	-	(+) COMMUNICATION CONNECTION
P4	COMM	RS-485 A	-	(-) COMMUNICATION CONNECTION
P5	COMM	RS-485	-	CONNECTION FOR SIMPLICITY PC SOFTWARE
P12	DI	C10	JUMPER	COMPRESSOR 1A MOTOR PROTECTION CIRCUIT
P12	DI	C20	JUMP / 440	COMPRESSOR 1B MOTOR PROTECTION CIRCUIT
P12	DI	C20	JUMP / 441	24 VAC TO COMMON
P12	DI	C30	JUMP / 442	COMPRESSOR 2A MOTOR PROTECTION CIRCUIT
P12	DI	C30	JUMP / 443	24 VAC TO COMMON
P12	DI	C40	JUMP / 444	COMPRESSOR 2B MOTOR PROTECTION CIRCUIT
P12	DI	C40	JUMP / 445	24 VAC TO COMMON
P10	DI	GV1	510	HEAT SECTION 1 GAS VALVE INPUT
P10	DI	GV2	525	HEAT SECTION 2 GAS VALVE INPUT
P10	DI	GV3	536	HEAT SECTION 3 GAS VALVE INPUT
TERMINAL	DI	24 VAC	301	24 VAC INPUT TO UNIT CONTROLLER FOR BINARY OUTPUTS
P11	DI	APS	411	AIR PROVING SIWTCH INPUT
P11	DI	APS	412	24 VAC TO COMMON
P12	DI	C10	JUMPER	COMPRESSOR 1A MOTOR PROTECTION CIRCUIT
TERMINAL	DI	COM	304	24 VAC COMMON
P22	DI	FILT	390	DIRTY FILTER SWITCH INPUT
P22	DI	FILT	391	24 VAC TO COMMON
P16	DI	FOVR	JUMP / 404	24 VAC TO COMMON
P16	DI	FOVR	JUMP / 403	SUPPLY FAN OVERLOAD INPUT CV UNITS ONLY
TERMINAL	DI	FSI	388	FREEZE STAT INPUT
TERMINAL	DI	FSP	389	24 VAC TO COMMON
P15	DI	HSP1	399	24 VAC TO COMMON
P15	DI	HSP1	400	COMPRESSOR SYSTEM 1 HIGH PRESSURE INPUT
P15	DI	HSP2	-	NOT USED
P15	DI	HSP2	400	JUMPERED TO HSP1
P16	DI	HSP3	431	24 VAC TO COMMON
P16	DI	HSP3	432	COMPRESSOR SYSTEM 2 1 HIGH PRESSURE INPUT
P16	DI	HSP4	-	NOT USED
P16	DI	HSP4	432	JUMPERED TO HSP3
P10	DI	LIM1	507	HEAT SECTION 1 LIMIT INPUT
P10	DI	LIM2	522	HEAT SECTION 2 LIMIT INPUT
P10	DI	LIM3	533	HEAT SECTION 3 LIMIT INPUT
P15	DI	LPS1	395	24 VAC TO COMMON
P15	DI	LPS1	396	COMPRESSOR SYSTEM 1 LOW PRESSURE INPUT
P15	DI	LPS2	-	NOT USED

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TABLE 8-8 – WIRING DATA (CONTINUED)

CONNECTOR #	TYPE	IDENTIFICATION	WIRE #	DESCRIPTION
P15	DI	LPS2	396	JUMPERED TO LSP1
P16	DI	LPS3	433	24 VAC TO COMMON
P16	DI	LSP3	434	COMPRESSOR SYSTEM 2 LOW PRESSURE INPUT
P16	DI	LPS4	-	NOT USED
P16	DI	LPS4	434	JUMPERED TO LSP3
TERMINAL	DI	R	SD JUMPER	24 VAC INPUT TO UNIT CONTROLLER
TERMINAL	DI	SDI	SD JUMPER	INPUT FOR SMOKE SHUTDOWN
TERMINAL	DI	SD2	303	24 VAC TO COMMON
P12	DO	C1	427	COMPRESSOR 1A OUTPUT
P12	DO	C2	428	COMPRESSOR 1BOUTPUT
P12	DO	C3	429	COMPRESSOR 2A OUTPUT
P12	DO	C4	430	COMPRESSOR 2B OUTPUT
P13	DO	CF1	423	CONDENSER FAN BANK 1 OUTPUT
P13	DO	CF2	425	CONDENSER FAN BANK 2 OUTPUT
P13	DO	EXH	422	EXHAUST FAN OUTPUT
P13	DO	FAN	421	SUPPLY FAN OUTPUT
P10	DO	H1	570	HEAT SECTION ONE OUTPUT
P10	DO	H2	572	HEAT SECTION TWO OUTPUT
P10	DO	H3	574	HEAT SECTION 3 OUTPUT
P3	FIELD INPUT	BAS ECON -	-	ECONOMIZER DAMPER INPUT - VDC
P3	FIELD INPUT	BAS ECON +	-	ECONOMIZER DAMPER INPUT + VDC
P1	FIELD INPUT	C	-	COMMON SIDE OF 24 VAC SUPPLY
P1	FIELD INPUT	G	-	SUPPLY FAN INPUT
P1	FIELD INPUT	OCC	-	OCCUPIED INPUT
P3	FIELD INPUT	PURGE	-	SMOKE PURGE INPUT
P1	FIELD INPUT	R	-	HOT SIDE OF 24 VAC SUPPLY
P19	FIELD INPUT	REM-	-	REMOTE RESET -
P19	FIELD INPUT	REM+	-	REMOTE RESET +
P1	FIELD INPUT	SD	-	NOT USED
P8	FIELD INPUT	GND	-	SPACE TEMPERATURE INPUT COMMON
P8	FIELD INPUT	SSO	-	SPACE TEMP SENSOR OFFSET +
P8	FIELD INPUT	ST	-	SPACE TEMPERATURE INPUT +
P2	FIELD INPUT	W1	-	IST STAGE HEAT INPUT
P2	FIELD INPUT	W2	-	2ND STAGE HEAT INPUT
P2	FIELD INPUT	W3	-	3RD STAGE HEAT INPUT
P1	FIELD INPUT	X	-	FAULT OUTPUT
P2	FIELD INPUT	Y1	-	1ST STAGECOOLING INPUT
P2	FIELD INPUT	Y2	-	2ND STATE COOLING INPUT
P2	FIELD INPUT	Y3	-	3RD STAGE COOLING INPUT
P3	FIELD INPUT	Y4	-	4TH STAGE COOLING INPUT
TERMINAL	FIELD OUTPUT / AO	VAV OPEN -	-	IDENTIFIES UNIT IS IN THE HEATING MODE (24 VDC -)
TERMINAL	FIELD OUTPUT / AO	VAV OPEN +	-	IDENTIFIES UNIT IS IN THE HEATING MODE (24VDC +)

FAULTS AND LOCKOUTS

LIGHT EMITTING DIODE

The light emitting diode (LED) installed on the Unit Controller is used to indicate the functionality of the Unit Controller and the unit. Normal operation is indicated by the LED flashing ON and OFF at a rate of one-second. A one-second ON followed by a one-second OFF flash. This means there are no active flash codes, faults or clock-outs. However there may be faults recorded in the history buffer.

A flash rate of 250 ms ON and OFF indicates a current alarm is present. The alarm code number will also be flashing on the four-digit character display. *See Table 8-9 for a description of each of the alarm codes.*

If the LED is constantly on (does not flash), the board has failed and must be replaced. If the LED is OFF this indicates no power to the board or a board failure. Two flashes ON, then two-seconds OFF indicates the control is timing out on an Anti-Cycle-Delay (ASCD). To bypass the ASCD timer depress the TEST/UP button 3 times within 5 seconds.

ALARM CODES

An active alarm is represented by a flashing alarm code numeral. There are 43 alarms in all. Not all the alarms are critical enough to shut down the system. Some alarms flag the problem to bring it to the attention of the operator or technician while allowing the system to continue to operate.

The display flashes the current or most recent code and contains the last five failures as well. To recall the last five failures from the most recent to the oldest of the five, press the “Alarm/Change” button once and each code is displayed for two seconds. Each failure code is numbered 1 to 5 and the number is shown in the two-digit character display located above the four-digit display.

The current and last five alarms can also be views under the “ALARM” tab using the Simplicity PC software.

A unit lockout can be reset in three ways:

- Removing the 24 VAC supply to the Unit Controller.
- Press the TEST/UP button twice in 5 seconds.
- By a communicated command.

TABLE 8-9 – ALARM CODE DESCRIPTIONS

ALARM CODE	DESCRIPTION
01	COMPRESSOR SYSTEM 1 (COMPRESSORS 1A, 1B) LOCKED OUT ON HIGH PRESSURE CONTROL. THE CIRCUIT OPENED THREE TIMES WITHIN A 2-HOUR WINDOW.
02	COMPRESSOR SYSTEM 1 (COMPRESSORS 1A, 1B) LOCKED OUT ON HIGH PRESSURE CONTROL. THE CIRCUIT OPENED THREE TIMES WITHIN A 2-HOUR WINDOW.
03	COMPRESSOR SYSTEM 2 (COMPRESSORS 2A, 2B) LOCKED OUT ON HIGH PRESSURE CONTROL. THE CIRCUIT OPENED THREE TIMES WITHIN A 2-HOUR WINDOW.
04	COMPRESSOR SYSTEM 2 (COMPRESSORS 2A, 2B) LOCKED OUT ON HIGH PRESSURE CONTROL. THE CIRCUIT OPENED THREE TIMES WITHIN A 2-HOUR WINDOW.
05	COMPRESSOR SYSTEM 1 (COMPRESSORS 1A, 1B) LOCKED OUT ON LOW PRESSURE CONTROL. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
06	COMPRESSOR SYSTEM 1 (COMPRESSORS 1A, 1B) LOCKED OUT ON LOW PRESSURE CONTROL. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
07	COMPRESSOR SYSTEM 2 (COMPRESSORS 2A, 2B) LOCKED OUT ON LOW PRESSURE CONTROL. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
08	COMPRESSOR SYSTEM 2 (COMPRESSORS 2A, 2B) LOCKED OUT ON LOW PRESSURE CONTROL. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
09	COMPRESSOR SYSTEM 1A LOCKED OUT ON COMPRESSOR MOTOR PROTECTION MODULE. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
10	COMPRESSOR SYSTEM 1B LOCKED OUT ON COMPRESSOR MOTOR PROTECTION MODULE. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
11	COMPRESSOR SYSTEM 2A LOCKED OUT ON COMPRESSOR MOTOR PROTECTION MODULE. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
12	COMPRESSOR SYSTEM 2B LOCKED OUT ON COMPRESSOR MOTOR PROTECTION MODULE. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
13	FIRST STAGE HEATING IS LOCKED OUT ON LIMIT SWITCH TRIPS. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
14	SECOND STAGE HEATING IS LOCKED OUT ON LIMIT SWITCH TRIPS. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
15	THIRD STAGE HEATING IS LOCKED OUT ON LIMIT SWITCH TRIPS. THE CIRCUIT OPENED THREE TIMES WITHIN A 1-HOUR WINDOW.
16	FIRST STAGE OF HEATING IS LOCKED OUT BECAUSE THE IGNITION CONTROL BOARD FAILED TO TURN ON THE GAS VALVE AFTER 5 MINUTES OF OPERATION OR THE GAS VALVE HAS VOLTAGE ON IT AND THE CONTROL IS NOT CALLING FOR THE STAGE OF HEATING.
17	SECOND STAGE OF HEATING IS LOCKED OUT BECAUSE THE IGNITION CONTROL BOARD FAILED TO TURN ON THE GAS VALVE AFTER 5 MINUTES OF OPERATION OR THE GAS VALVE HAS VOLTAGE ON IT AND THE CONTROL IS NOT CALLING FOR THE STAGE OF HEATING.
18	THIRD STAGE OF HEATING IS LOCKED OUT BECAUSE THE IGNITION CONTROL BOARD FAILED TO TURN ON THE GAS VALVE AFTER 5 MINUTES OF OPERATION OR THE GAS VALVE HAS VOLTAGE ON IT AND THE CONTROL IS NOT CALLING FOR THE STAGE OF HEATING.
19	SPACE TEMPERATURE SENSOR HAS FAILED OPEN OR SHORTED. THE DISPLAY WILL INDICATE –40.0.
20	SUPPLY AIR TEMPERATURE SENSOR HAS FAILED OPEN OR SHORTED. THE DISPLAY WILL INDICATE –40.0.
21	RETURN AIR TEMPERATURE SENSOR HAS FAILED OPEN OR SHORTED. THE DISPLAY WILL INDICATE –40.0.
22	OUTDOOR AIR TEMPERATURE SENSOR HAS FAILED OPEN OR SHORTED. THE DISPLAY WILL INDICATE –40.0.
23	DIRTY FILTER SWITCH HAS CLOSED INDICATING THE FILTERS NEED REPLACED. THIS HAS NO EFFECT ON THE OPERATION OF THE UNIT.

Continued on next page

TABLE 8-9 – ALARM CODE DESCRIPTIONS (CONTINUED)

ALARM CODE	DESCRIPTION
24	THE SUPPLY FAN BINARY OUTPUT HAS BEEN TURNED ON FOR 90 SECONDS AND THE AIR PROVING SWITCH CIRCUIT HAS NOT CLOSED.
25	THE SUPPLY FAN BINARY OUTPUT HAS BEEN TURNED OFF FOR 90 SECONDS AND THE AIR PROVING SWITCH CIRCUIT HAS NOT OPENED.
26	A MICROELECTRONICS FAILURE HAS OCCURRED AND THE CONTROL IS OPERATING ON DEFAULTS.
27	A MICROELECTRONICS FAILURE HAS OCCURRED AND THE CONTROL IS DOWN DUE TO A FATAL FAULT.
28	THIS INDICATES THE SUPPLY FAN BINARY OUTPUT IS TURNED ON AND THE SUPPLY FAN OVERLOAD CIRCUIT IS OPEN. THIS HAS TO OCCUR 3 TIMES WITHIN A TWO HOUR WINDOW.
29	THIS INDICATES THE OUTDOOR AIR HUMIDITY SENSOR IS OUT OF RANGE. WHEN THIS OCCURS, THE UNIT CONTROLLER SWITCHES THE ECONOMIZER TYPE TO DRY BULB.
30	THIS INDICATES THE RETURN AIR HUMIDITY SENSOR IS OUT OF RANGE. WHEN THIS OCCURS, THE UNIT CONTROLLER SWITCHES THE ECONOMIZER TYPE TO SINGLE ENTHALPY.
31	THIS INDICATES THE IAQ (CO2) SENSOR IS OUT OF RANGE. THE UNIT CONTROLLER CHANGES THE VENTILATION MODE TO FIXED MINIMUM.
32	THIS INDICATES THE REAL TIME CLOCK CANNOT BE READ AS A RESULT OF A HARDWARE FAILURE.
33	THIS INDICATES THE SPACE TEMPERATURE OFFSET IS GREATER THAN 20 K OHMS.
34	THIS INDICATES THE CV/VAV INPUT IS OUT OF RANGE. THE UNIT WILL LOCK OUT.
35	THIS INDICATES THE 24-VOLT SUPPLY CIRCUIT HAS DROPPED BELOW THE ALLOWABLE LEVEL. THE CONTROL WILL SHUT DOWN UNTIL THE VOLTAGE RISES ABOVE 19.2 VAC.
36	THIS INDICATES THE UNIT COOLING AND HEATING OPERATION IS SHUT DOWN BECAUSE THE UNIT IS OPERATING IN A SMOKE PURGE MODE.
37	THIS INDICATES THE DUCT STATIC PRESSURE HAS EXCEEDED THE PROGRAMMED DUCT STATIC SHUTDOWN SETPOINT.
38	THIS INDICATES THE SUPPLY AIR TEMPERATURE HAS EXCEEDED THE PROGRAMMED SUPPLY AIR TEMP ALARM SETPOINT FOR COOLING.
39	THIS INDICATES THE SUPPLY AIR TEMPERATURE HAS EXCEEDED THE PROGRAMMED SUPPLY AIR TEMP ALARM SETPOINT FOR HEATING.
40	THIS INDICATES AN ECONOMIZER MINIMUM POSITION ALARM.
41	THIS INDICATES THE SPACE TEMPERATURE IS ABOVE THE SPACE TEMP TRENDING ALARM TEMP AND MOVING AWAY FROM THE SPACE TEMPERATURE SETPOINT.
42	THIS INDICATES THE DUCT STATIC HAS NOT RISEN QUICKLY ENOUGH IN A VAV UNIT WHEN THE SUPPLY FAN IS ENERGIZED.
43	THIS INDICATES THE HYDRONIC HEAT FREEZE STAT HAS OPENED AND THE OUTDOOR TEMPERATURE IS BELOW 45.0° F.

ALARM TROUBLE SHOOTING

Refrigerant System Alarm Codes (01, 02, 03, 04, 09, 10, 11, 12)

The first 12 alarms involve controls intended to protect the compressors. Each compressor system is equipped with external circuitry monitoring hardware intended to protect the compressor in case the operating characteristics of the refrigerant system fall outside the safe operating envelope for the compressor. The type of protection varies depending on the type of compressor used.

YPAL 050 Compressors 1A, 1B, 2A, and 2B
YPAL 051 Compressors 1A, 1B, 2A, and 2B
YPAL 060 Compressors 1A and 2A
YPAL 061 Compressor 1A

The Compressor Safety Circuit consists of a high-pressure cutout switch. Each of the compressors is also protected by internal line break switch imbedded in the windings of the compressor that protects the compressor from excessive current or temperatures. The Unit Controller will not be able to identify the internal line break switch is open and no fault will be generated or reported by the Unit Controller.

If the internal line break is open it will appear as a compressor failure. To trouble shoot verify the compressor contactor for the compressor that is not running, is closed and line voltage is present on the load and line side of all three legs. If so remove power from the unit and remove the cover from the compressor control box. Check for an open winding. If all three winding are open carefully check the compressor shell. If the shell is hot no determination can be made until the shell has cooled. If the shell is cool and a winding is open the compressor is defective. If the windings close as the compressor cools the internal line break switch was open. Some possible causes for an open switch are, high discharge super heat (low charge), start of a bearing failure (partial locked rotor), or high voltage.

The above units also have a low- pressure cutout that will be discussed later.

Since tandem compressors are used there is a single high pressure switch for system 1 and one for system 2. If the high pressure switch opens both of the compressors for that system will be turned off. If the high pressure switch for system 1, (compressors 1A, 1B), opens it will generate both a 01 and 02 alarm code. Likewise if the high pressure switch opens for system 2, (compressors 2A, 2B), opens it will generate both a 03 and 04 alarm code.

The high pressure switch opens at 625 PSIG and closes at 500 PSIG. In order to generate a high pressure lockout the high pressure switch must open three times within a 2 hour window.

24 VAC power is supplied to the system 1 high pressure switch circuit from wire 399 at terminal HPS1 of the P15 connector. The binary input back to the Unit Controller from the high pressure switch is wire 400 at terminal HPS1 of the P15 connector. The above input is then jumpered to terminal HSP2 of the P15 connector.

24 VAC power is supplied to the system 2 high pressure switch circuit from wire 431 at terminal HPS3 of the P16 connector. The binary input back to the Unit Controller from the high pressure switch is wire 432 at terminal HPS3 of the P16 connector. The above input is then jumpered to terminal HPS4 of the P16 connector.

Because there is no external compressor protection module on these models jumpers are placed between terminals C10 and C10 of the P12 connector for compressor 1A, C20 and C20 of the P12 connector for compressor 1B, C30 and C30 of the P12 connector for compressor 2A, and C40 and C40 of the P12 connector for compressor 2B.

YPAL 060 Compressors 1B and 2B
YPAL 061 Compressors 1B, 2A and 2B

The high pressure switches are connected as described above; however, the compressors identified above employ a compressor protection module. 24 VAC power is supplied to the compressor protection module for compressor 1B from wire 441 at terminal C20 of the P12 connector. The binary input back to the Unit Controller from the compressor protection module is wire 440 at terminal C20 of the P12 connector.

24 VAC power is supplied to the compressor protection module for compressor 2A from wire 443 at terminal C30 of the P12 connector. The binary input back to the Unit Controller from the compressor protection module is wire 442 at terminal C30 of the P12 connector.

24 VAC power is supplied to the compressor protection module for compressor 2B from wire 445 at terminal C40 of the P12 connector. The binary input back to the Unit Controller from the compressor protection module is wire 444 at terminal C40 of the P12 connector.

Low Pressure Cutout Alarm (09, 10, 11, 12)

Since tandem compressors are used there is a single low pressure switch for system 1 and one for system 2. If the low pressure switch opens both of the compressors for that system will be turned off. If the low pressure switch for system 1, (compressors 1A, 1B), opens it will generate both a 09 and 10 alarm code. Likewise if the low pressure switch opens for system 2, (compressors 2A, 2B), opens it will generate both an 11 and 12 alarm code.

The low pressure switch opens at 50 PSIG and closes at 71 PSIG. In order to generate a low pressure lockout the high pressure switch must open three times within a 2 hour window.

During the start up of the compressor system the low pressure switch input is ignored for 30 seconds. After the 30 second delay if the low pressure switch circuit opens for 5 seconds the Unit Controller will turn off both compressors for the system.

24 VAC power is supplied to the system 1 low pressure switch circuit from wire 395 at terminal LPS1 of the P15 connector. The binary input back to the Unit Controller from the low pressure switch is wire 396 at terminal LPS1 of the P15 connector. The above input is then jumpered to terminal LPS2 of the P15 connector.

24 VAC power is supplied to the system 2 low pressure switch circuit from wire 433 at terminal LPS3 of the P16 connector. The binary input back to the Unit Controller from the low pressure switch is wire 434 at terminal LPS3 of the P16 connector. The above input is then jumpered to terminal LPS4 of the P16 connector.

Limit Switch Alarms (13, 14, 15)

The control monitors the limit switch status for each of the heating sections installed. If the limit switch circuit opens the control de-energizes the heat section output for the section with the open limit circuit and energizes the indoor blower output. The supply fan performs a Fan Delay Off when the limit re-closes.

In order to generate a limit lockout the limit switch must open three times within a 2-hour window.

The limit input for heat section 1 is located at terminal LIM1 wire 507 of the P10 connector. The limit input for heat section 2 is located at terminal LIM2 wire 522 of the P10 connector. The limit input for heat section 3 is located at terminal LIM3 wire 533 of the P10 connector.

Gas Heating Alarms (16, 17, 18)

The Unit Controller monitors the output to the gas valve. If the Unit Controller is calling for the operation of the heat stage and voltage is not present after 5 continuous minutes it will generate an alarm.

If the Unit Controller is not calling for the operation of the heat stage and voltage is present at the gas valve for 5 continuous minutes it will generate an alarm and lock on the supply fan. If the input goes away the control will revert to normal operation.

The gas valve input for heat section 1 is located at terminal GV1 wire 510 of the P10 connector. The gas valve input for heat section 2 is located at terminal GV2 wire 525 of the P10 connector. The gas valve input for heat section 3 is located at terminal GV3 wire 536 of the P10 connector.

Space Temperature Sensor Alarm (19)

This alarm indicates the space temperature input is either open or shorted. The display will show a value of –40.0° F. The space temperature input is at ST and GND of the P6 connector. To trouble shoot compare the resistance of the input to the temperature in the space using Table 8-1.

Supply Air Temperature Sensor Alarm (20)

This alarm indicates the supply air temperature input is either open or shorted. The display will show a value of –40.0° F. The supply air temperature input is at SAT+ and SAT- of the P11 connector. To trouble shoot compare the resistance of the input to the actual supply air temperature using Table 8-1.

Return Air Temperature Sensor Alarm (21)

This alarm indicates the return air temperature input is either open or shorted. The display will show a value of –40.0° F. The return air temperature input is at RAT+ and RAT- of the P11 connector. To trouble shoot compare the resistance of the input to the actual return air temperature using Table 8-1.

Outdoor Air Temperature Sensor Alarm (22)

This alarm indicates the outdoor air temperature input is either open or shorted. The display will show a value of –40.0° F. The outdoor air temperature input is at OAT+ and OAT- of the P11 connector. To trouble shoot compare the resistance of the input to the actual outdoor air temperature using Table 8-1.

Dirty Filter Switch Alarm (23)

This alarm will have no effect on the operation of the unit. The alarm indicates the dirty filter switch contacts have closed indicating the pressure drop across the filters is above the setting of the switch. The 24 VAC output to the switch is at terminal FILT wire 391 of the P22 connector and the input to the control is at terminal FILT wire 390 of the P22 connector.

Supply Fan Air Proving Switch (24)

This alarm indicates there was a call for supply fan operation and after 90 seconds of supply fan operation the switch did not close. The Unit Controller will retry the fan output every 30 minutes for three retires. If after the three retries the Unit Controller will lockout heating and cooling operation.

On a VAV unit the Unit Controller will also use the duct static pressure input to qualify supply fan operation. If the Unit Controller reads more then 0.05" WC it will continue to identify the alarm but allow the unit to operate.

The 24 VAC output to the switch is at terminal APS wire 412 of the P11 connector and the input to the control is at terminal APS wire 411 of the P11 connector.

Supply Fan Air Proving Switch Closed Alarm (25)

This alarm indicates the call for supply fan operation has been terminated and after 90 seconds of supply fan operation the switch remained closed. The control will flash the alarm but allow the unit to operate normally.

The 24 VAC output to the switch is at terminal APS wire 412 of the P11 connector and the input to the control is at terminal APS wire 411 of the P11 connector.

Microelectronics Failure Alarm (26)

This alarm indicates a problem with the Unit Controller microelectronics has occurred and the Unit Controller is operating on default values. Try recycling power to the control. If the fault reappears replace the Unit Controller.

Microelectronics Failure Alarm (27)

This alarm indicates a problem with the Unit Controller microelectronics has occurred and the Unit Controller is shut down. Try recycling power to the control. If the fault reappears replace the Unit Controller.

Supply Fan Overload Alarm (28)

The Unit Controller monitors this circuit anytime the supply fan is operative. If this input is lost for 50 milliseconds, the control will shut down all unit operation. If the voltage input does not return in 5-minutes the control will turn on the alarm.

If the voltage returns the Unit Controller will log the first incident and track the run time. If the switch opens three times in a two-hour period the Unit Controller will shut down the unit.

The 24 VAC output to the switch is at terminal FOVR wire 404 of the P16 connector and the input to the control is at terminal FOVR wire 403 of the P16 connector.

Outdoor Humidity Sensor Alarm (29)

This alarm indicates the outdoor humidity sensor is out of range. When this occurs the Unit Controller will switch economizer operation to Dry Bulb. The Outdoor Humidity analog input is at OH+ wire 333 of the P6 connector and OH- wire 334 of the P6 connector. To trouble shoot the sensor verify 24 VAC between terminals EXC and COM of the sensor. Also verify the VDC between the OUT and COM connection of the sensor. If no voltage is present replace the sensor.

Return Humidity Sensor Alarm (30)

This alarm indicates the return humidity sensor is out of range. When this occurs the Unit Controller will switch economizer operation to Single Enthalpy. The Return Humidity analog input is at RH+ wire 335 of the P6 connector and OH- wire 336 of the P6 connector. To trouble shoot the sensor verify 24 VAC between terminals EXC and COM of the sensor. Also verify the VDC between the OUT and COM connection of the sensor. If no voltage is present replace the sensor.

IAQ (CO2) Sensor Alarm (31)

This alarm indicates the IAQ (CO2) sensor is out of range. When this occurs the Unit Controller will switch the ventilation mode from Demand to Fixed Minimum. The IAQ sensor input is at terminal DV+ and DV-. This device is field supplied.

Time Clock Error Alarm (32)

This alarm indicates the Unit Controller Real Time Clock is not functioning. The Unit Controller will shut down all operation. Try recycling power to the control. If the fault reappears replace the Unit Controller.

Space Temperature Offset Alarm (33)

This alarm is generated when the resistance in the Space Temperature Offset circuit is greater then 20,000 ohms. The Space Temperature Offset input is at terminals SSD and GND of the P6 connector. Check the resistance between these to points. If greater then 20,000 ohms check the tightness of the connections and the wire wiring between the Unit Controller and the space sensor. If both are okay and the resistance is still greater then 20,000 ohms replace the space sensor reset.

CV/VAV Input Alarm (34)

This alarm indicates the resistance between terminals CV/VAV and CV/VAV at the P7 connection is out of range. The acceptable range is 0.0 to 20,000 ohms. Check the resistance between the two CV/VAV terminals and take appropriate action.

Low Voltage Alarm (35)

The Unit Controller monitors the 24 VAC input to the control. The input has two thresholds. The voltage must be above 19.2 VAC or the control will not turn on a contactor. If the voltage is not above this value it will not turn on the contactor and flashes the fault code. If contactors are energized and the voltage drops below 16 .0 volts the Unit Controller will de-energize the contactors and flash the alarm. To trouble shoot check the voltage between the “R” and “COM” at the ¼ inch terminals on the board.

Smoke Purge Mode Alarm (36)

This is not an alarm but rather an indication the unit has been placed in a smoke purge mode. Verify the presence of 24 VAC between PURGE connection at the P3 connector and “C” on the P1 connector. If 24 VAC is present and the unit is not supposed to be in the Purge mode trace the field wiring to determine why the voltage is present.

High Duct Static Pressure Alarm (37)

This alarm indicates the duct static pressure has exceeded the Duct Static Shutdown Setpoint. The problem could be caused by a faulty Duct Static Pressure Transducer input. To check measure the VDC input between terminal DP+ wire 337 at the P21 connector and terminal DP- wire 338 at the P21 connector. Compare the voltage verses the duct pressure the control indicates to Table 8-2 in this section of the manual. Also verify that 24 VAC is present between terminals “COM” and “EXC” at the duct static transducer.

Supply Air Temperature Cooling Alarm (38)

The Unit Controller compares the supply air temperature to the "*SUPPLY AIR TEMP ALARM FOR COOLING*" and initiates the alarm based on the following criteria:

- All the stages of cooling have been on for 10 or more minutes.
- The supply air temperature is 20 or more degrees above the "*SUPPLY AIR TEMP ALARM FOR COOLING*" set point for 10 minutes.
- The outdoor air is not 20.0° F or more warmer then the "*SUPPLY AIR TEMP ALARM FOR COOLING*" set point.
- The outdoor air damper is not open more then 20%.

Supply Air Temperature Heating Alarm (39)

The Unit Controller compares the supply air temperature to the "*SUPPLY AIR TEMP ALARM FOR HEATING*" and initiates the alarm based on the following criteria:

- All the stages of heating have been on for 10 or more minutes.
- The supply air temperature is 20 or more degrees below the "*SUPPLY AIR TEMP ALARM FOR HEATING*" set point for 10 minutes.
- The outdoor air is not 20.0° F or more cooler then the "SUPPLY AIR TEMP ALARM FOR HEATING" set point.
- The outdoor air damper is not open more then 20%.

Economizer Minimum Position Alarm (40)

Prior to declaring this fault the Unit Controller checks the outside air temperature and the economizer position. If the outside air temperature is more then 20.0° F warmer then the set point and the economizer is open more then 20%, the Unit Controller will close the economizer for 10 minutes and then check the supply air temperature. If the SAT falls below the set point, the control will declare an economizer minimum position alarm. The Unit Controller will keep the economizer closed until the end of the cooling cycle. It will then return the economizer damper to its minimum position.

Space Temperature Trending Alarm (41)

This alarm will be generated based on the following criteria:

- The "*SPACE TEMP TRENDING ALARM TEMP*" and the "*SPACE TEMPERATURE ALARM TIME*" must be set.
- The unit has been in a given mode of operation for 10 minutes.
- The temperature is below or above the space temperature set point and the trend continues to be away from the space temperature set point and the "*SPACE TEMP TRENDING ALARM TIME*" has expired.

Duct Static Low Pressure Alarm (42)

This alarm is initiated on a VAV unit if after 35 seconds of supply fan operation the duct static pressure is not equal to or greater then 0.05" WC. When the alarm becomes active the unit stops all operation and locks out. This can be the result of a faulty Duct Static Pressure Transducer or in the transition from an unoccupied to occupied mode if the VAV boxes are wide open.

To check the operation of the duct static transducer measure the VDC input between terminal DP+ wire 337 at the P21 connector and terminal DP- wire 338 at the P21 connector. Compare the voltage verses the duct pressure the control indicates to Table 8-2 in this section of the manual. Also verify that 24 VAC is present between terminals "COM" and "EXC" at the duct static transducer.

Hot Water Coil Freeze Alarm (43)

The alarm indicates the hydronic freeze stat switch has opened. The 24 VAC source originates at the terminal FSP, wire 389. The input to the control originates at terminal FSI, wire 388.

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